Environmental Analysis and Development Potential in the Creswell Area of Harford County, MD

LARC 642: Graduate Landscape Architecture Graduate Studio III
Regional Design Studio 2018, Fall 2018

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The University of Maryland, College Park
PALS - Partnership for Action Learning in Sustainability
An Initiative of the National Center for Smart Growth

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Acknowledgments

Introduction

This project was undertaken as part of the UMD PALS program by graduate Landscape Architecture students in LARC 642 in the fall of 2018. It contributes to a series of courses addressing the development potential of the Creswell study area in Harford County. The objectives of this course were threefold:

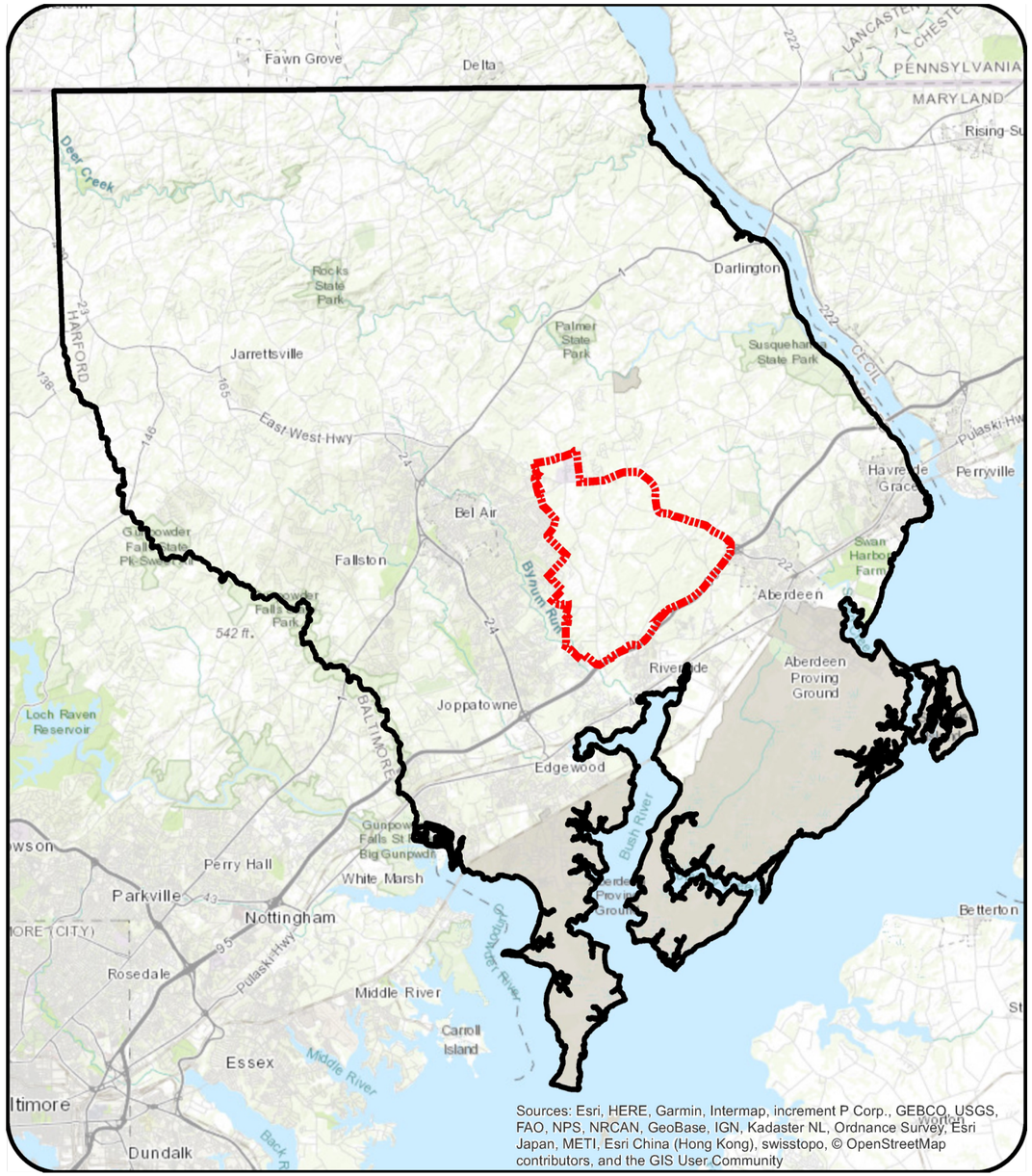
1. Identify abiotic, biotic, and cultural characteristics that significantly influence development patterns of the Creswell area;

2. Undertake an assessment of developable potential of the Creswell area; and

3. Visually document patterns of land use of the built environment for the understanding of potential development patterns of the Creswell area.

This document is organized along the basis of these three objectives.

Introduction



Creswell Study Area

The boundary of the Creswell Study Area used in this project was provided to the class. The Creswell Study Area is 12,864 acres. The Creswell Area is geographically defined on the southern boundary by Interstate 95. The western boundary is Route 22 from Interstate 95 to Route 155 at the community of Churchville. The northern boundary is a continuation of Route 22 but also includes Harford Community College and lands immediately adjacent to the west of the College. The western border of the Creswell Area is aligned between areas that are serviced by sewer and areas in the Creswell Area which are not serviced by sewer. In addition to Harford Community College and the communities of Creswell and Churchville, significant sites include Schucks Regional Park and Cedar Lane Regional Park.

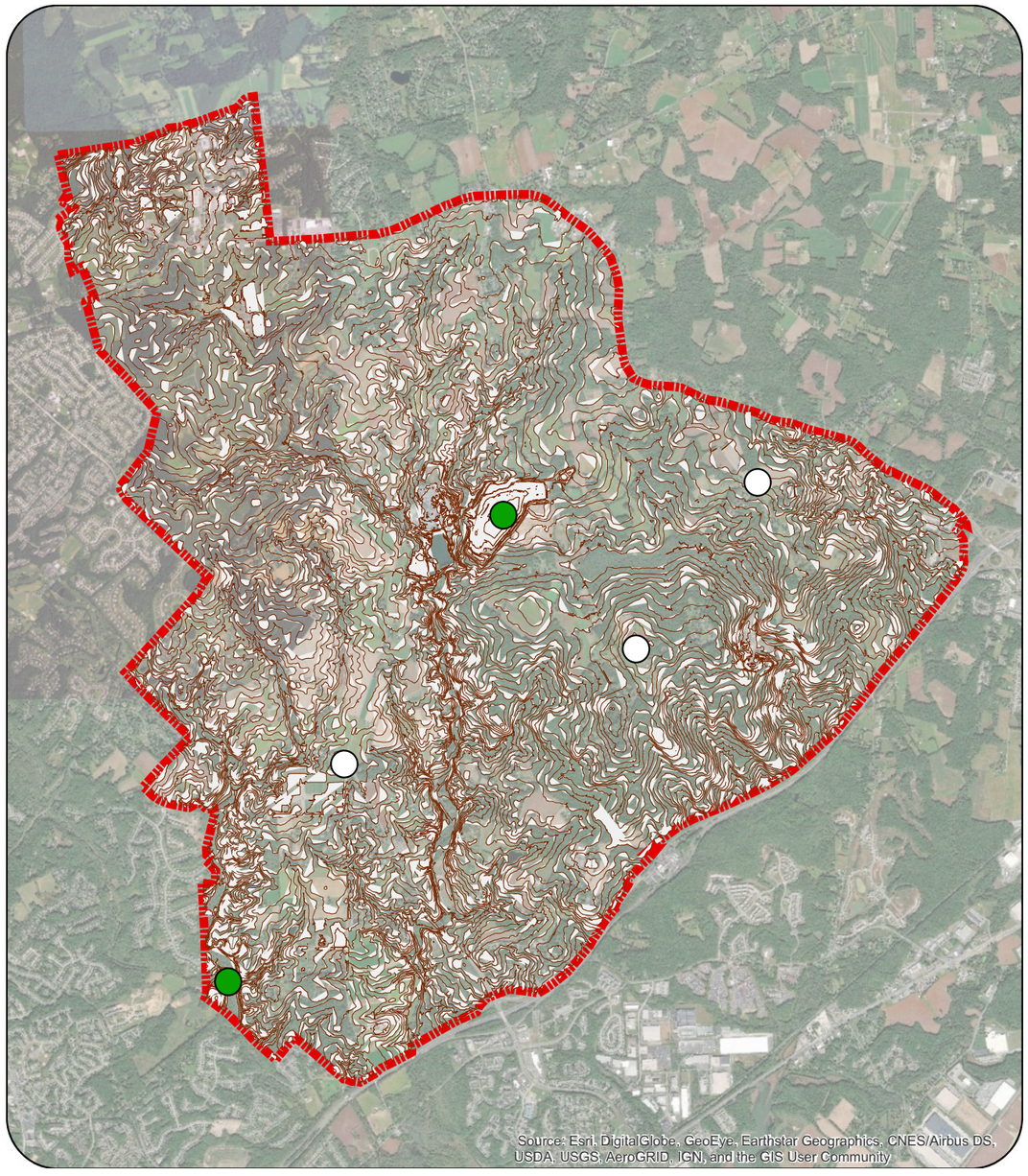
Legend

Creswell Study Area

Harford County

Creswell Study Area

Abiotic Inventory



0 1 2 4 6 Miles

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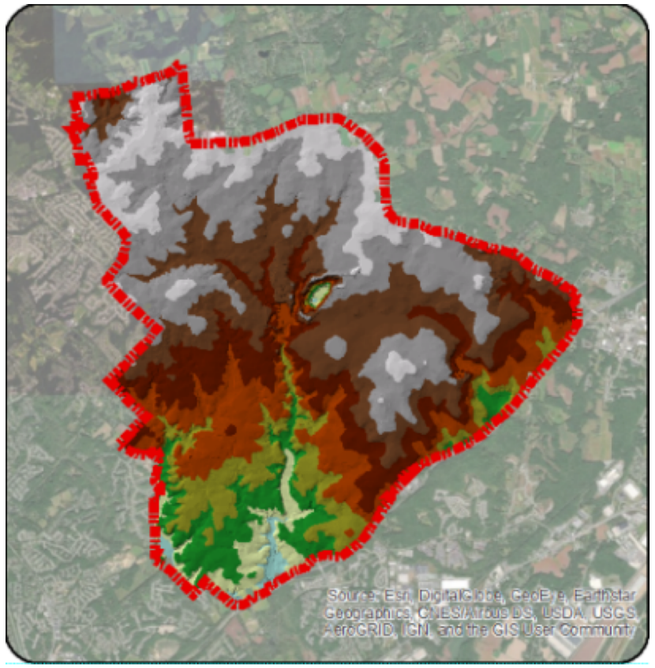
Contours and Relief



0 1 2 4 Miles

Legend

Creswell Relief Map

Elevation

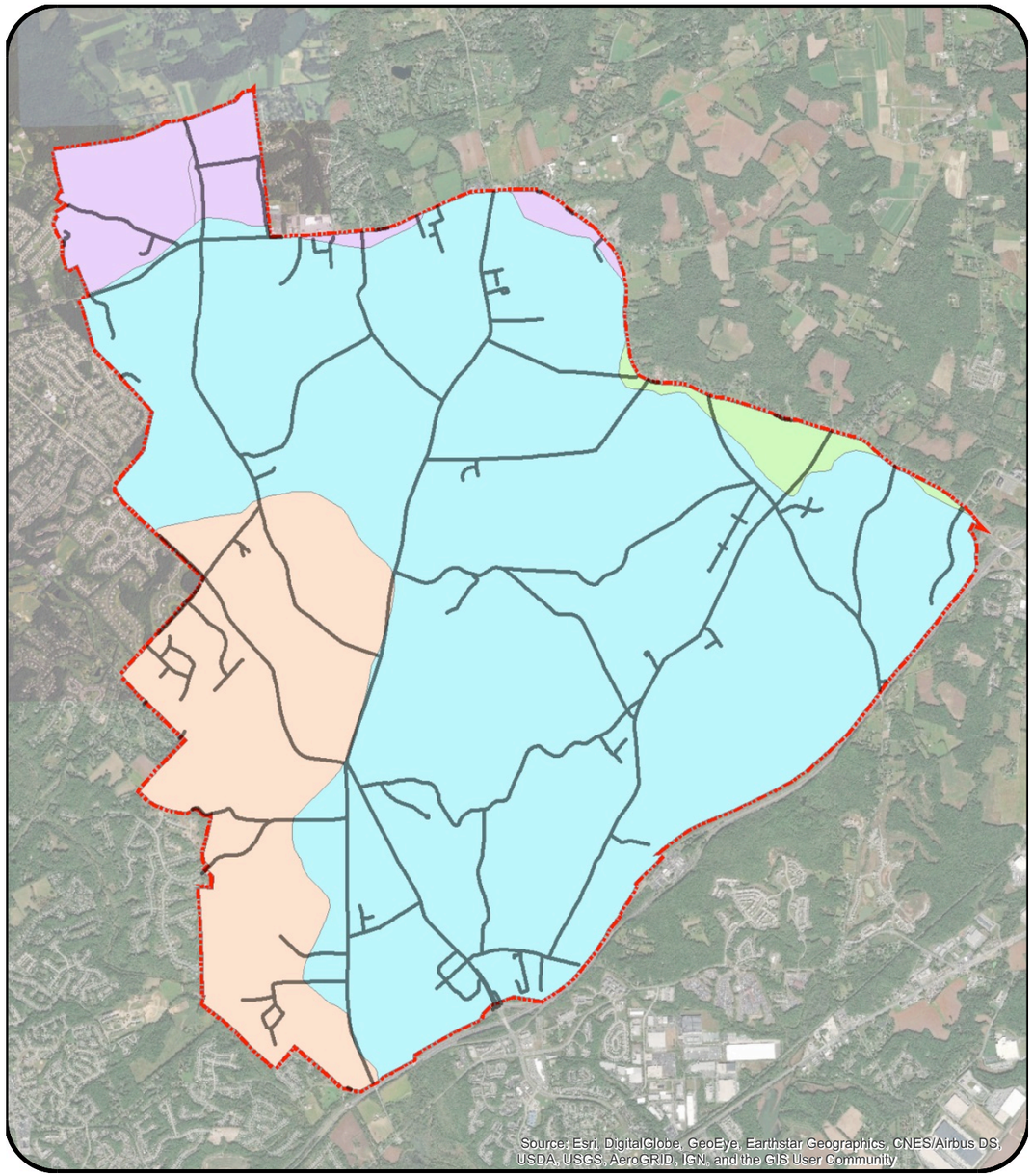
- 375.556 - 420
- 331.111 - 375.556
- 286.667 - 331.111
- 242.222 - 286.667
- 197.778 - 242.222
- 153.333 - 197.778
- 108.889 - 153.333
- 64.444 - 108.889
- 20 - 64.444

There is about a 350 foot difference between the highest and lowest points in the Creswell area. The quarry brings unique slopes to the area. There is some agricultural land with gentle slopes, while there are some steep areas around Harford Community College.

Legend

- Low Points
- High Points
- 10' Contours

Contours and Relief



Watersheds

Harford County contains four major river basins - the Bush River Basin, the Gunpowder River Basin, the Lower Susquehanna River Basin, and the Upper Western Shore Basin, which all drain to the Chesapeake Bay Watershed. These larger watersheds are made up of many smaller watersheds. For example, the Bush River Basin is comprised of the Otter Point Creek, Bush Creek, and Church Creek sub-basins.

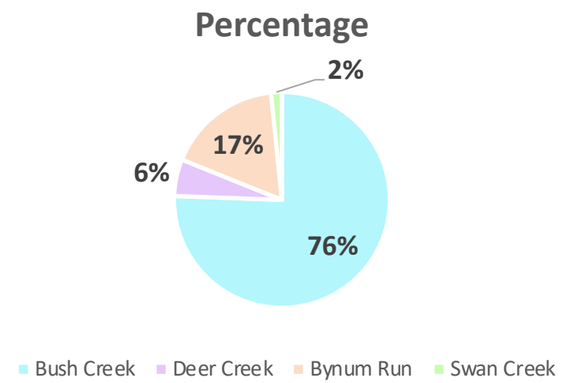
The majority of the Creswell area is located within the Bush River watershed- 76 percent. The south-western side is located within the Bynum Run watershed (17%). The remaining area are within the Deer (6%) and Swan Creeks (2%) watersheds.

Legend

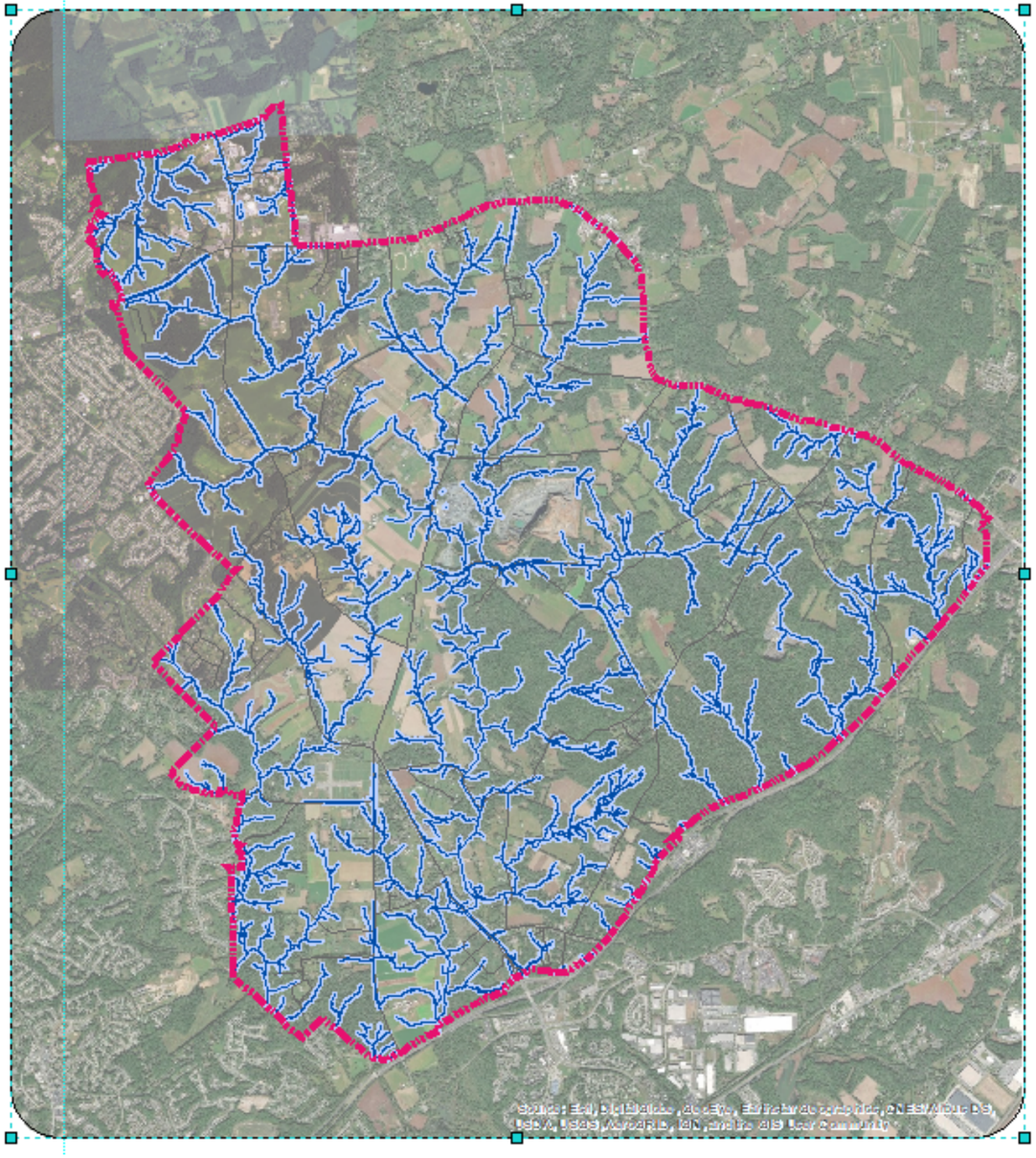
- Major Roads

Watersheds

- Bush River
- Bynum Run
- Deer Creek
- Swan Creek



Watersheds



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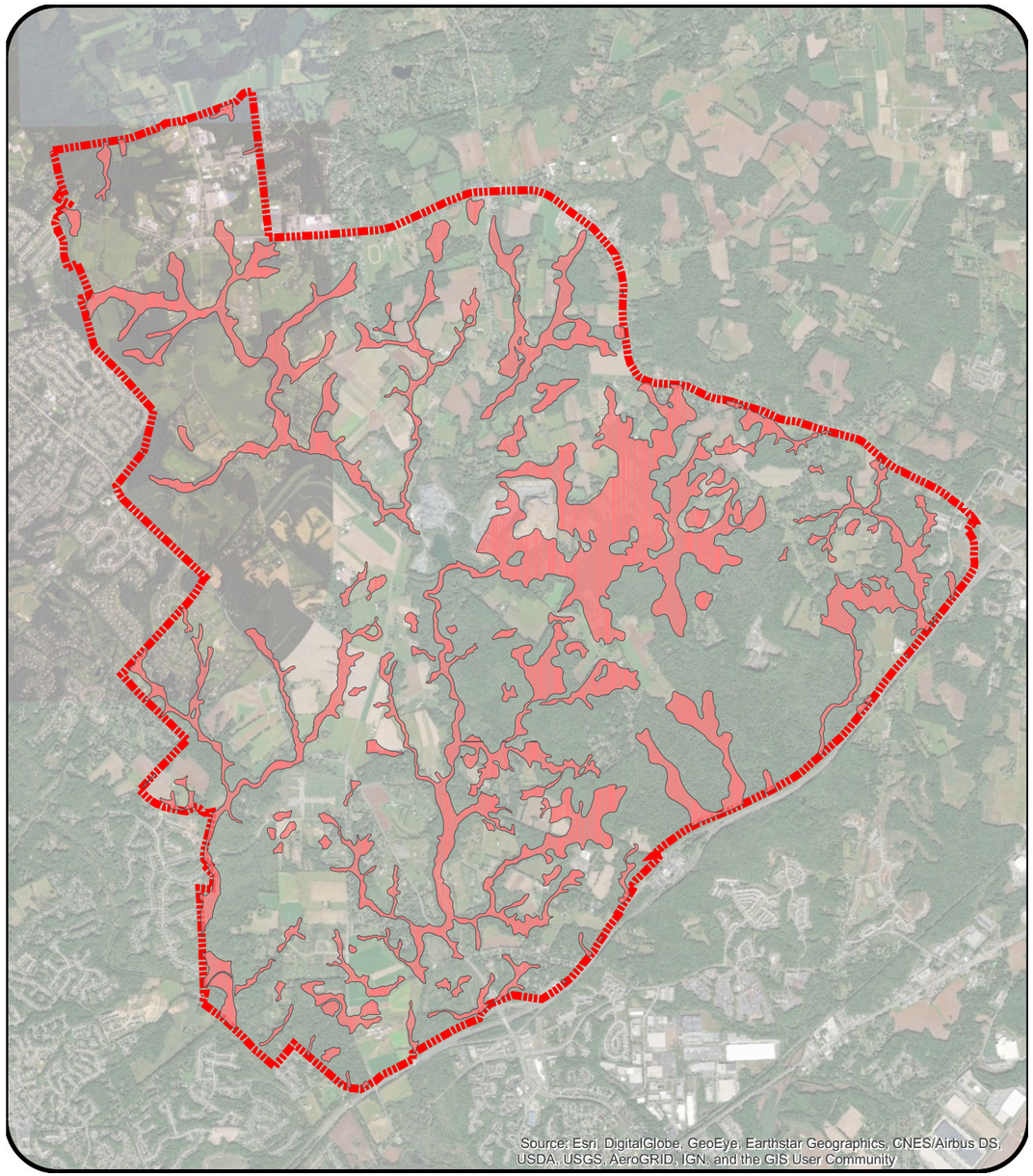
Streams and 75 Foot Buffers

Harford County requires a minimum buffer of 75 feet to streams and wetlands. Certain streams within the county receive a buffer of 150 feet on both sides of its banks. These buffers help keep dirt and other pollutants from entering the surface waters by employing the natural vegetation of the area as a filter. Storm water coming off developed areas are filtered through the natural buffers before these waters reach the stream in a buffered area.

Legend

- Creswell Stream Buffers
- 75 ft. Stream Buffers
- Street Center Lines
- Creswell Boundary

Streams and 75 Foot Buffers



Hydric Soils

According to the USDA Natural Resources Conservation Service, a hydric soil is one "that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part." Hydric soils are important to consider when choosing land to develop because they are potentially wetlands, and they can be unstable.

There are approximately 2,380 acres of hydric soils in the Creswell area. Approximately 18% of land in Creswell consists of hydric soils.

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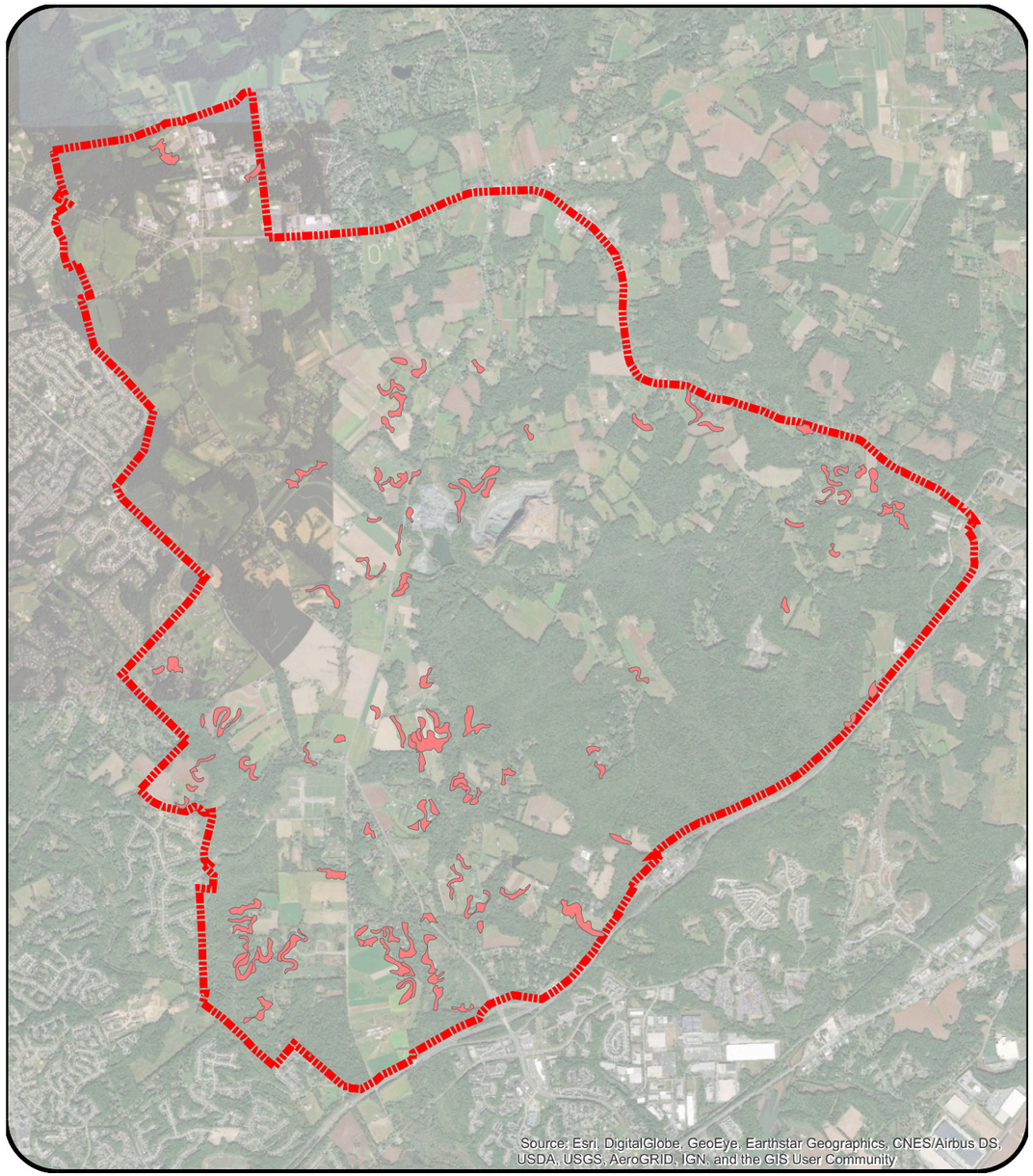
Legend

- Hydric Soils
- Creswell Boundary

Hydric Soils



Severely Eroded Soils

The Creswell area is approximately 12,864 acres. About 327 acres is classified as soil that is severely eroded. This means approximately 2.5% of soils are severely eroded.

Erosion can be caused by water, wind or tillage. Harford County is dominated by agricultural practices, so it is likely these have played a large role in the severely eroded soils. These soils should not be developed upon, as they are not stable.

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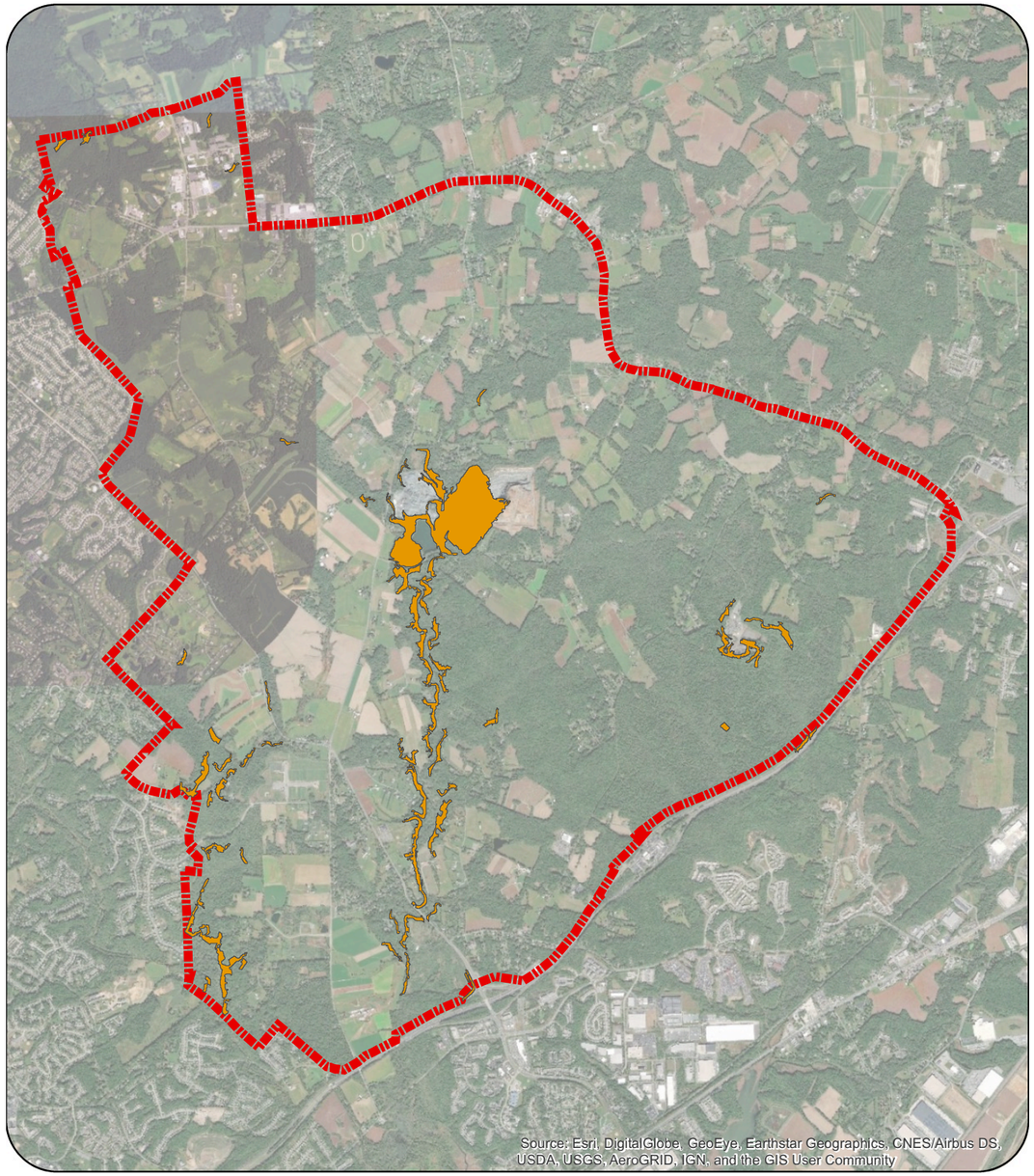
Legend

- Severely Eroded Soils
- Creswell Boundary

Severely Eroded Soils



Slopes Greater than 25%

There are about 313 acres (2.4 %) of slopes greater than 25% in the Creswell area. This is important information because these slopes must be considered when building in the Creswell area. They are not stable and should not be built on, and should be dealt with in an environmentally safe way.

There has been historic flooding and channelization due to farming which has led to gully creation.

There are four main areas in which the slopes greater than 25% are present. These include:

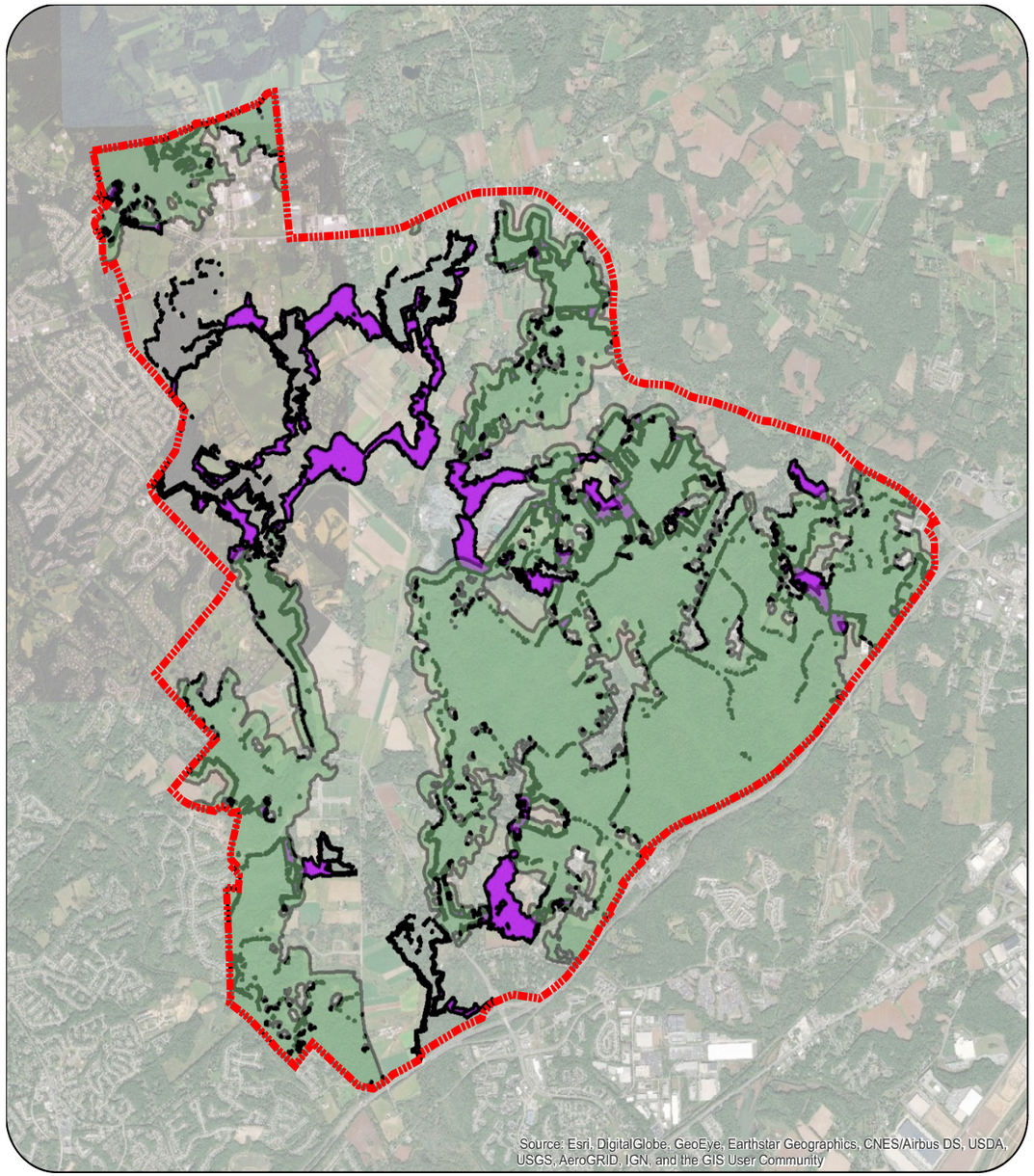
1. Surrounding the active LaFarge-Churchville Quarry
2. Along the Bush Stream from North to South
3. Along the Southwestern portion of the Creswell area
4. Surrounding the land belonging to Maryland Paving Inc. Asphalt Plant

Legend

Slopes over 25%

Slopes Greater than 25%

Biotic Inventory



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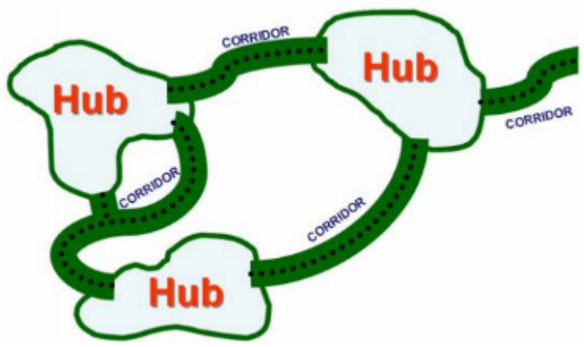
Green Infrastructure Hubs and Corridors

The Green Infrastructure network is composed of three general features: core areas, hubs, and corridors. Core areas provide high-quality natural habitat. Adjacent to core areas, hubs are large areas with some natural habitat value, potentially located on the outskirts of some agricultural zones. Corridors are generally narrow, linear natural areas that link cores together and allow animal movement between those areas.

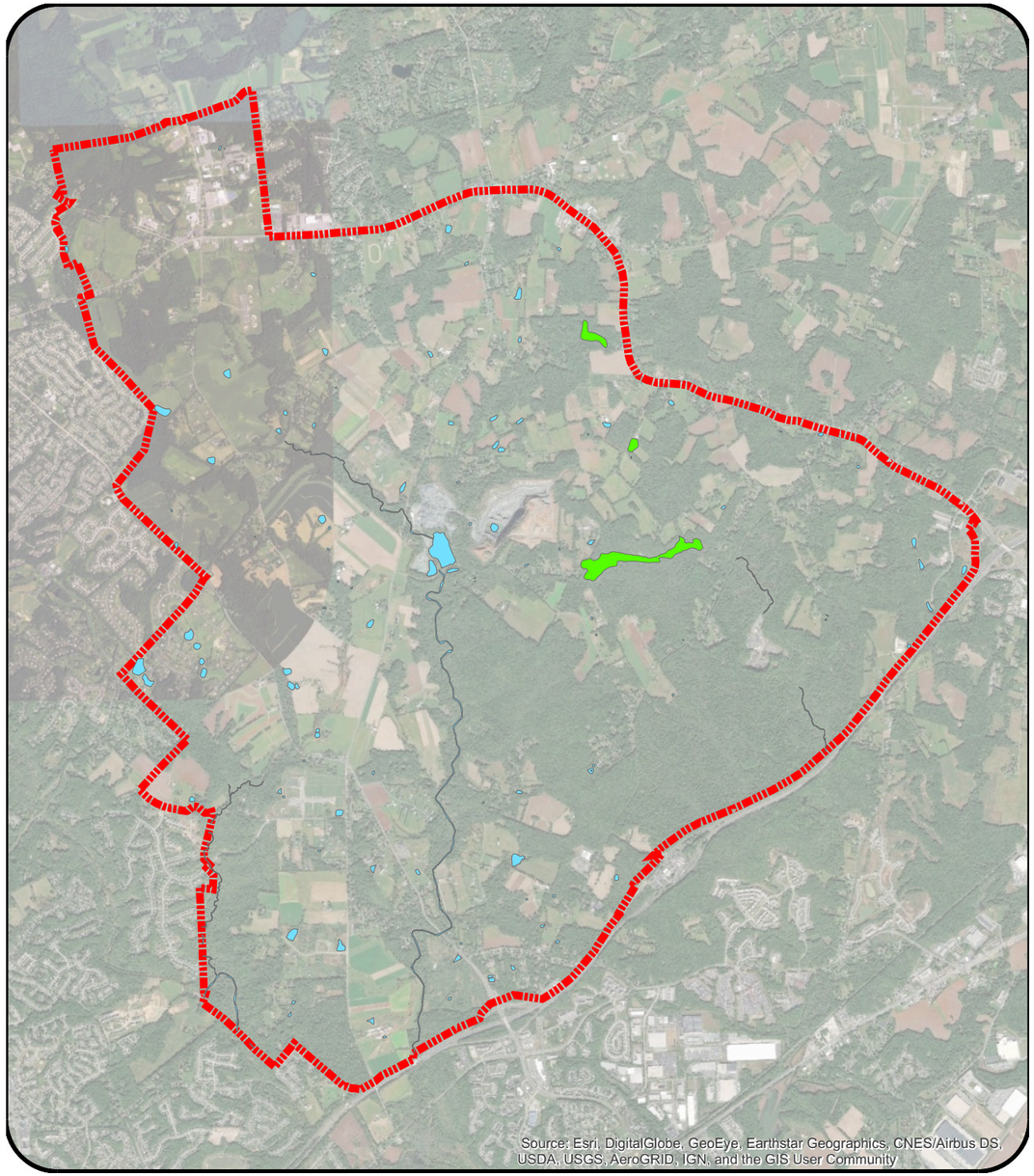
Legend

- Creswell
- Harford Hubs
- Harford Corridors

Green Infrastructure Concept



Green Infrastrcuture Hubs and Corridors



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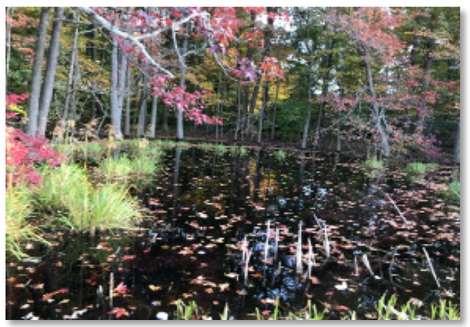
Wetlands and Open Water

Open water and wetlands account for approximately 137 acres or 1.1% of the total Creswell Area

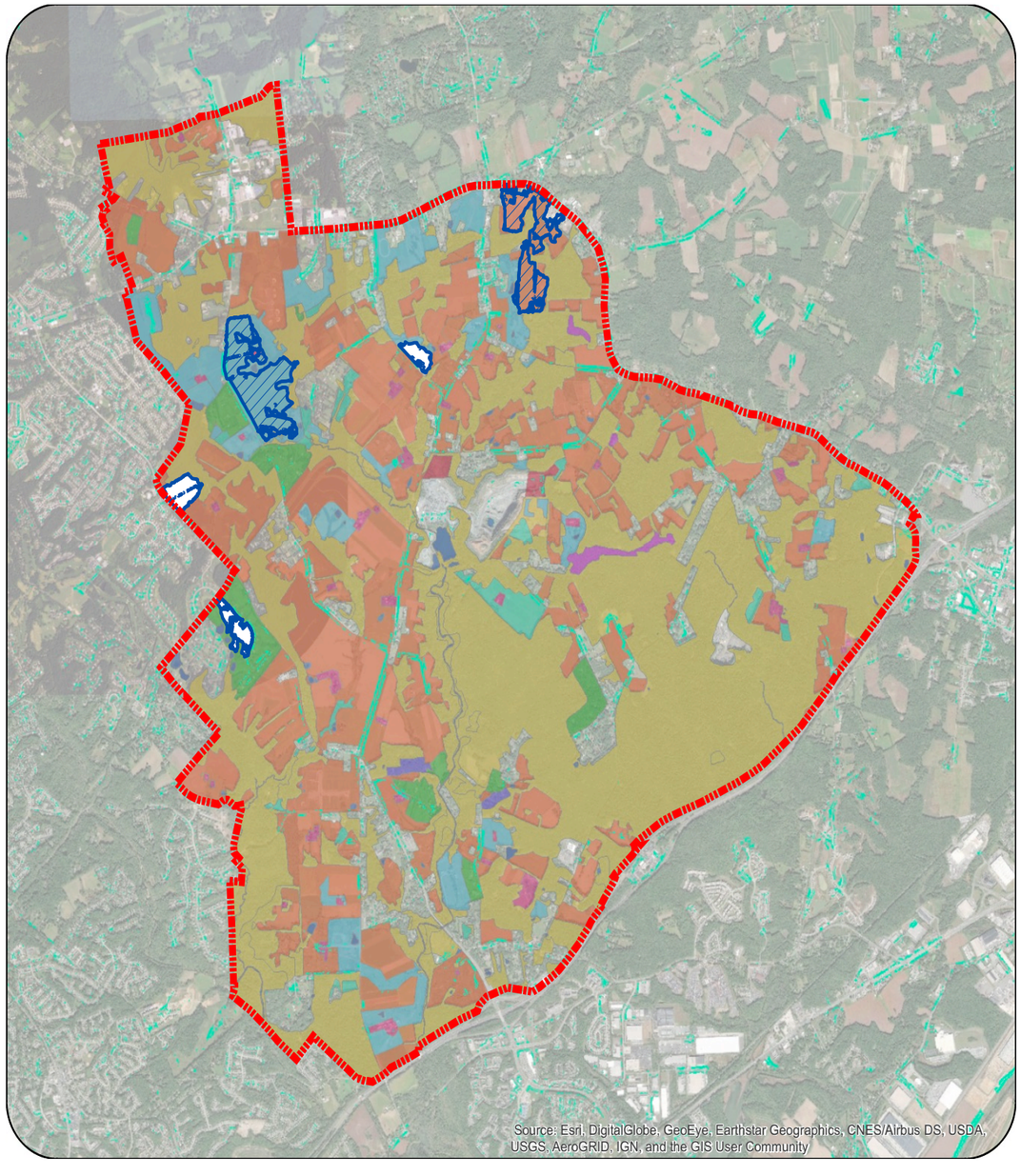
Harford County protects many of its sensitive environmental features through the Natural Resources District (NRD) subsection of the Zoning Code (267-62). Harford County was one of the forerunners in establishing local protection of these sensitive environmental areas.

Legend

- Open Water 97 Acres / 0.8%
- Wetlands 40 Acres / 0.3%



Wetlands



Targeted Bioretention

The bioretention areas in Creswell are mostly in the form of swales. Student recommendations for constructed wetlands and swales are shown on the map. As indicated, there are a few places where constructed bioretention areas could be built and be beneficial. Land cover classifications are depicted to better understand the Creswell areas predominate usage of space and land. The chart on the following page describes the Best Management Practices for watersheds.

Under tHarford County's Stormwater Management Program, new development that requires the management of stormwater runoff must utilize Environmental Site Design (ESD) or construct a Best Management Practice (BMP). These structures include infiltration, flow attenuation, retention, extended detention, detention and underground storage.

Legend

- Creswell
- Possible Sites Constructed wetlands
- Swales

Landcover Designations: Classifications

- Agriculture-Large Lot Subdivision
- Forest-Large Lot Subdivision
- Cropland
- Pasture
- Ag Facilities
- Forested
- Brush
- Water
- Wetlands
- Bare Ground

Targeted Bioretention

Harford County BMP Site Suitability Criteria

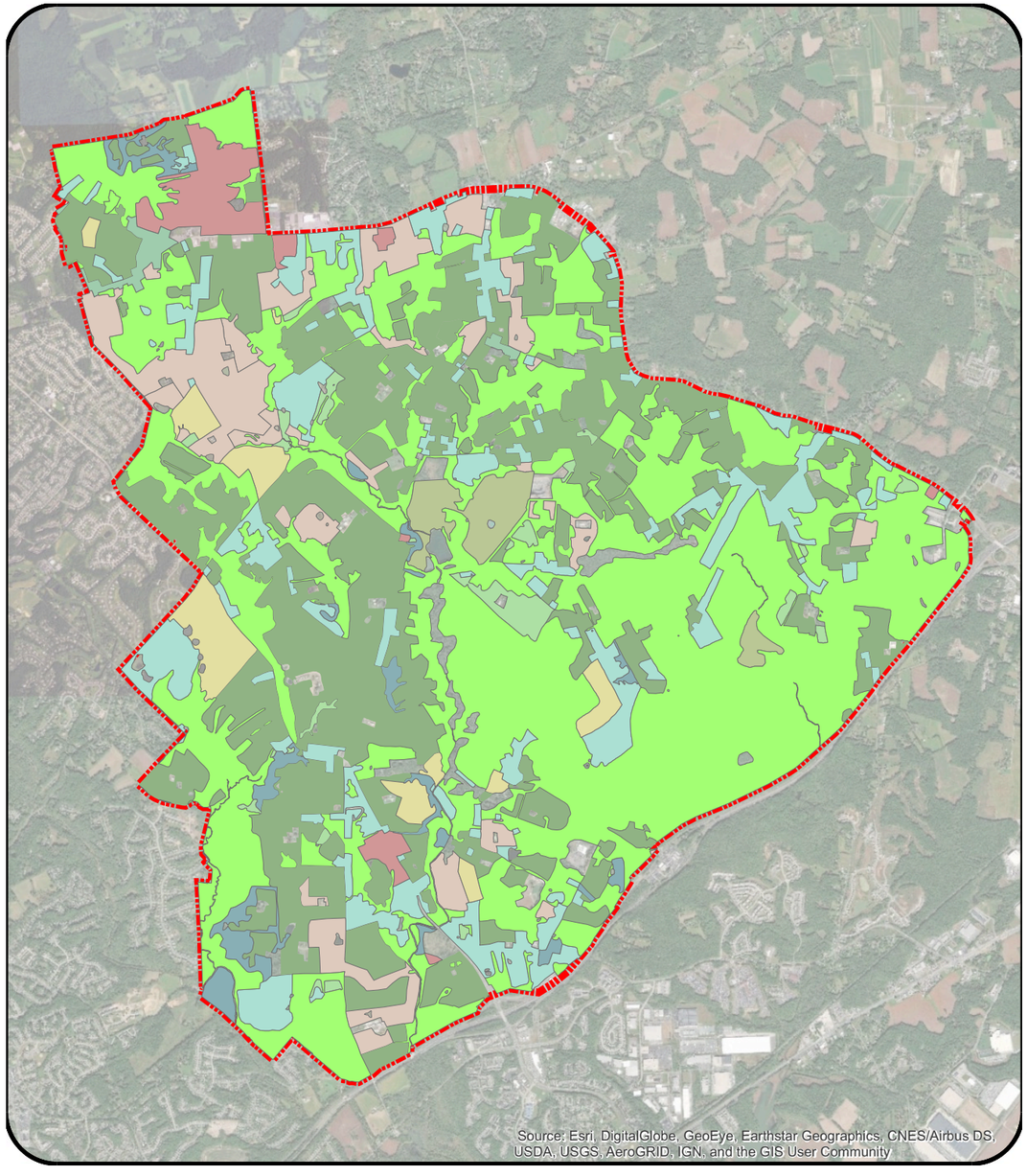
(modified from Shoemaker, L., J. Riverson Jr., K. Alvi, J. X. Zhen, S. Paul, and T. Rafi. 2009. SUSTAIN: A Framework for Placement of Best Management Practices in Urban Watersheds to Protect Water Quality. National Risk Management Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, OH. EPA/600/R-09/095.)

	Site Suitability Criteria							
BMP	Drainage Area (acre)	Slope (%)	Hydrological Soil Group	Water Table Depth (cm)	Road Buffer (ft)	Stream Buffer (ft)	Wetland Buffer (ft)	Land cover
Bioretention	< 2	< 5	A–D	> 61	< 100	> 100	> 100	Grass, bare earth, parking lots
Constructed Wetland	> 25	< 15	A–D	> 122	–	> 100	> 100	Grass, bare earth
Dry Pond	> 10	< 15	A–D	> 122	–	> 100	> 100	Grass, bare earth
Grassed Swale	< 5	< 4	A–D	> 61	< 100	–	–	Grass, bare earth, parking lots
Infiltration Basin	< 10	< 15	A–B	> 122	–	> 100	> 100	Grass, bare earth
Infiltration Trench	< 5	< 15	A–B	> 122	–	> 100	> 100	Grass, bare earth, parking lots
Porous Pavement	< 3	< 1	A–B	> 61	–	–	–	parking lots
Sand Filter (non-surface)	< 2	< 10	A–D	> 61	–	> 100	> 100	Grass, bare earth, parking lots
Sand Filter (surface)	< 10	< 10	A–D	> 61	–	> 100	> 100	Grass, bare earth, parking lots
Vegetated Filterstrip	–	< 10	A–D	> 61	< 100	–	–	Grass, bare earth, parking lots
Wet Pond	> 25	< 15	A–D	> 122	–	> 100	> 100	Grass, bare earth

Green roofs, rain barrels, and cisterns did not require site targeting.
Exclude open water, forests, wetlands, buildings, roads, and railroads from other BMP siting.

Targeted Bioretention

Cultural Inventory

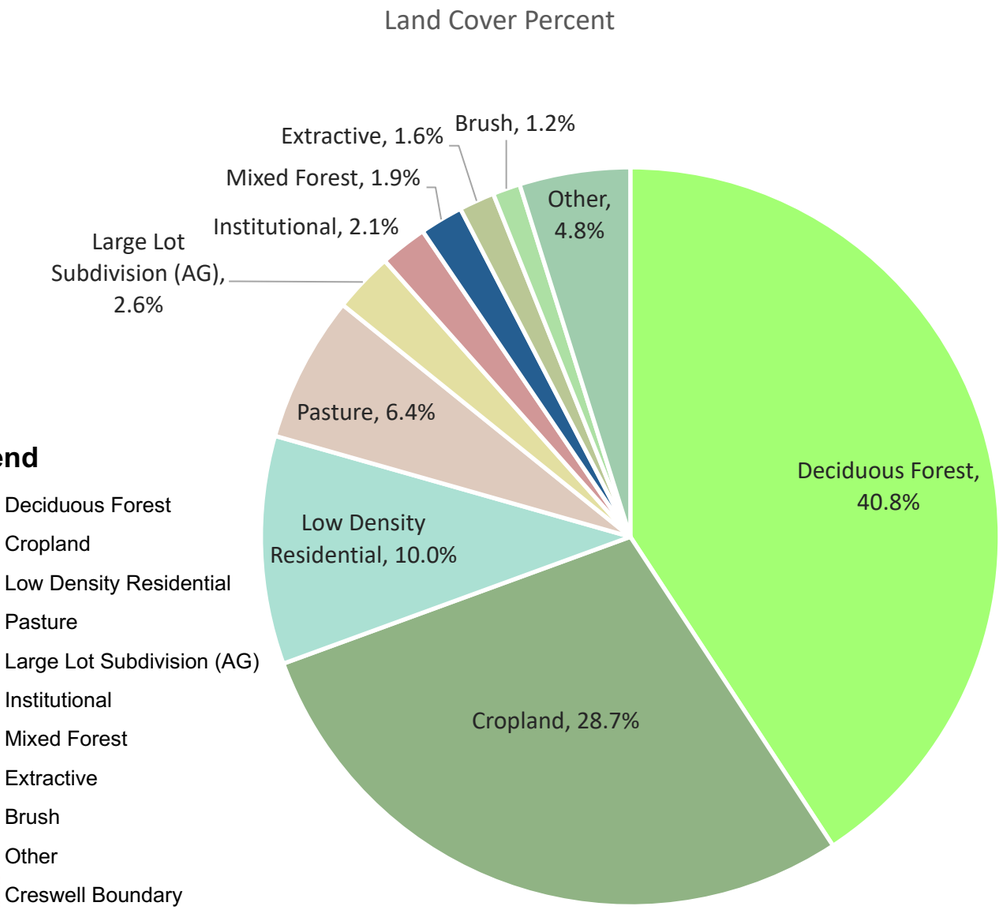


Land Cover

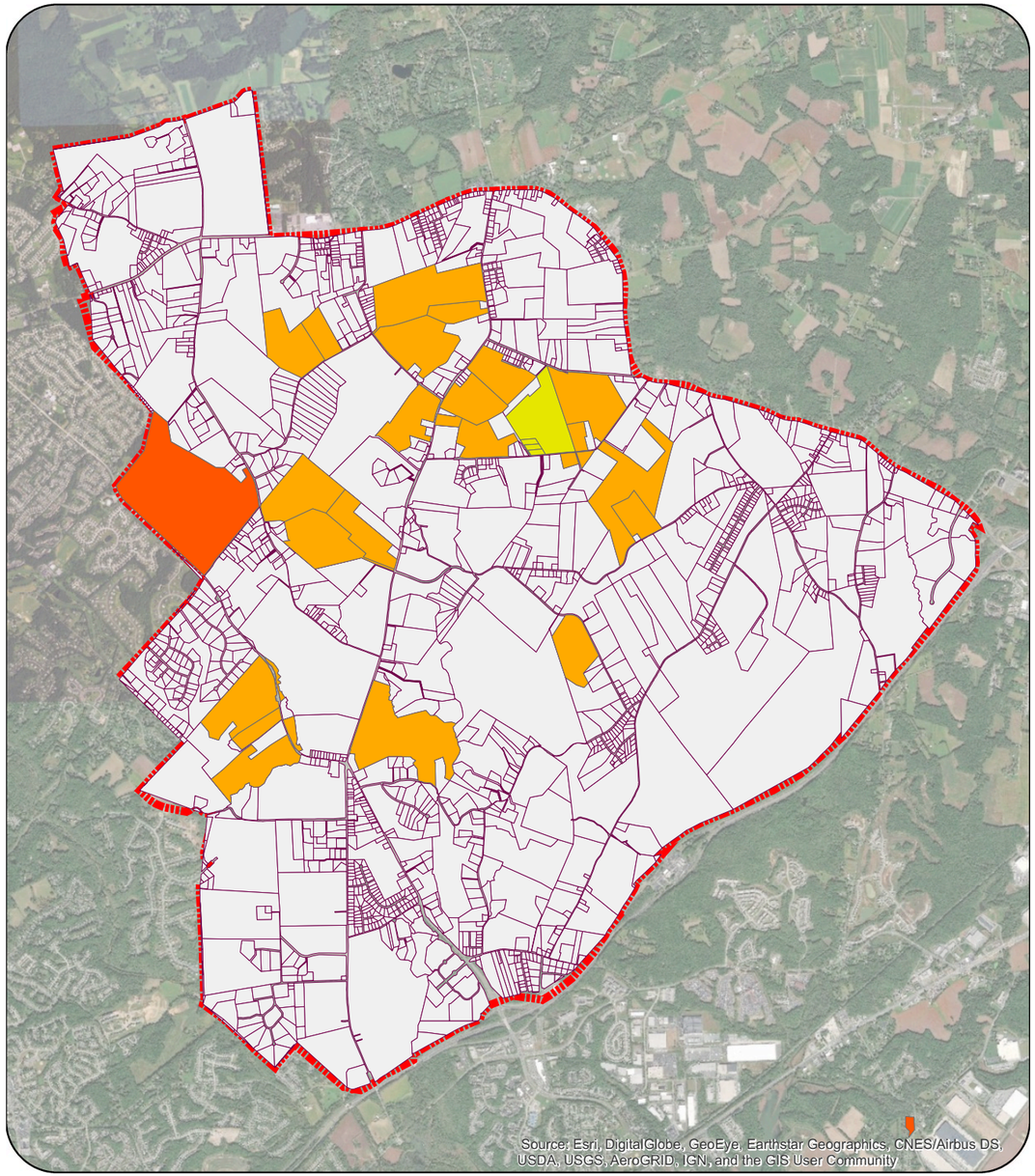
The Creswell area is sparsely developed. The majority of land in the Creswell area is either deciduous forested (40.8%), cropland (28.7%) or low density residential (10%).

Legend

- Deciduous Forest
- Cropland
- Low Density Residential
- Pasture
- Large Lot Subdivision (AG)
- Institutional
- Mixed Forest
- Extractive
- Brush
- Other
- Creswell Boundary

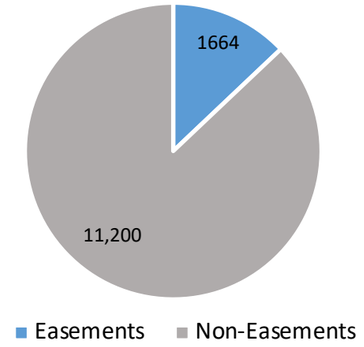


Land Cover



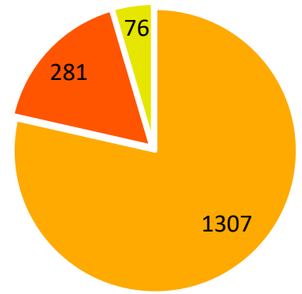
Easements in Acres

The Creswell Area has significant easement acreages. Thirteen percent of the area (13%) is in easements.



Easements by Type in Acres

Agricultural Easements (79%) account for the greatest percent of easements.

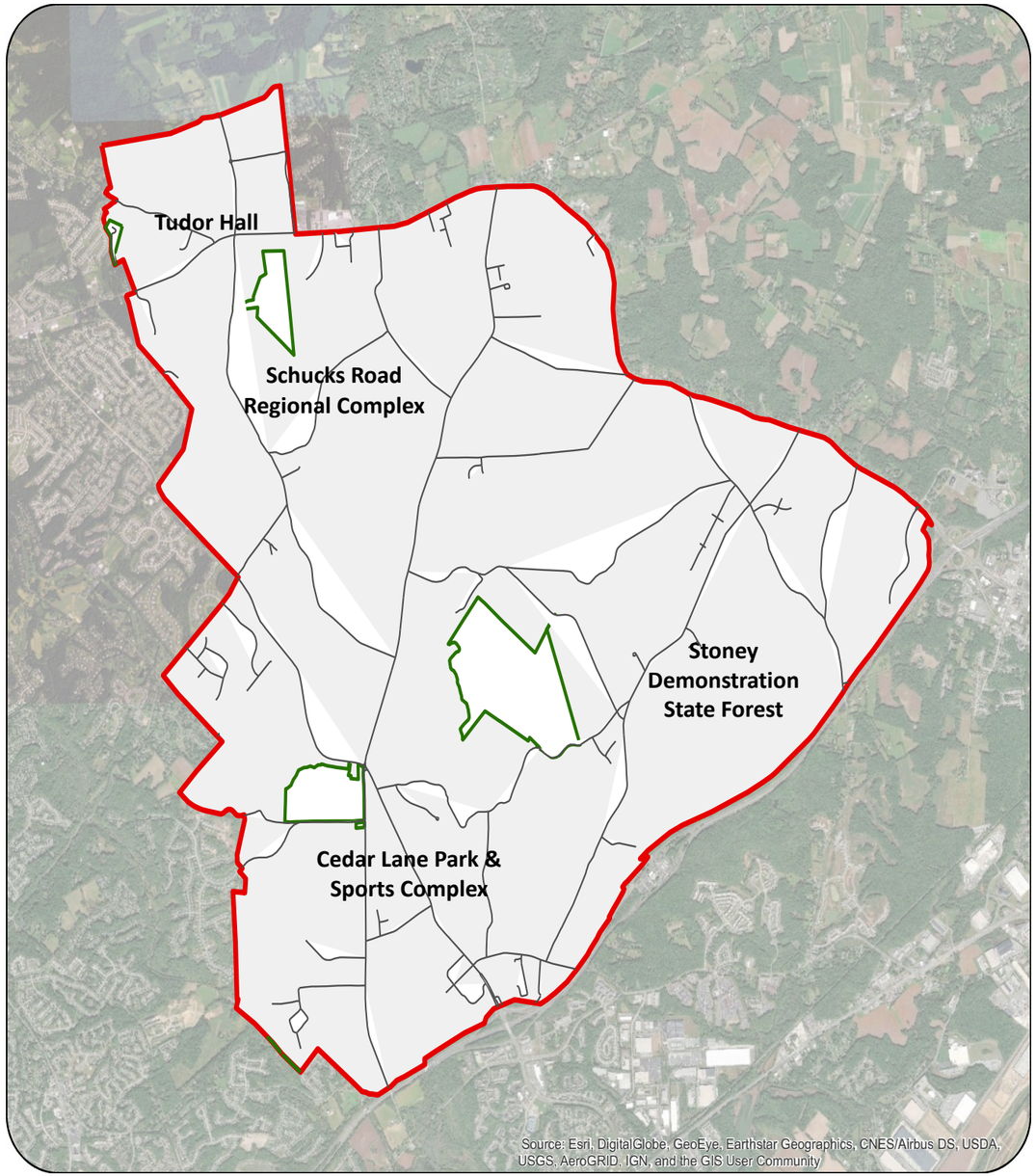


Legend

- Agriculture Preservation Easements
- Historic and MET Easements
- MET Easements Only
- Property Boundaries
- Creswell

N

Easements



Parks

Stoney Demonstration Forest (317.87 acres)

Objective: To use scientific forest management techniques to demonstrate the integration of the multiple uses of the forest land of SDF, to include the production of commercial forest products, the enhancement of wildlife habitat, the protection of soil and water resources, and the maintenance as a forest recreation site in Harford County, MD. (DNR)

Cedar Lane Park & Sports Complex (112.3 acres)

Maintained and managed by Cedar Lane Sports Foundation (opened in 2008) Has 13 multisport fields and a trail loop around park (1.46 miles) Parking for 1000 cars 500,000+ visitors annually (cedarlanesports.org/sports)

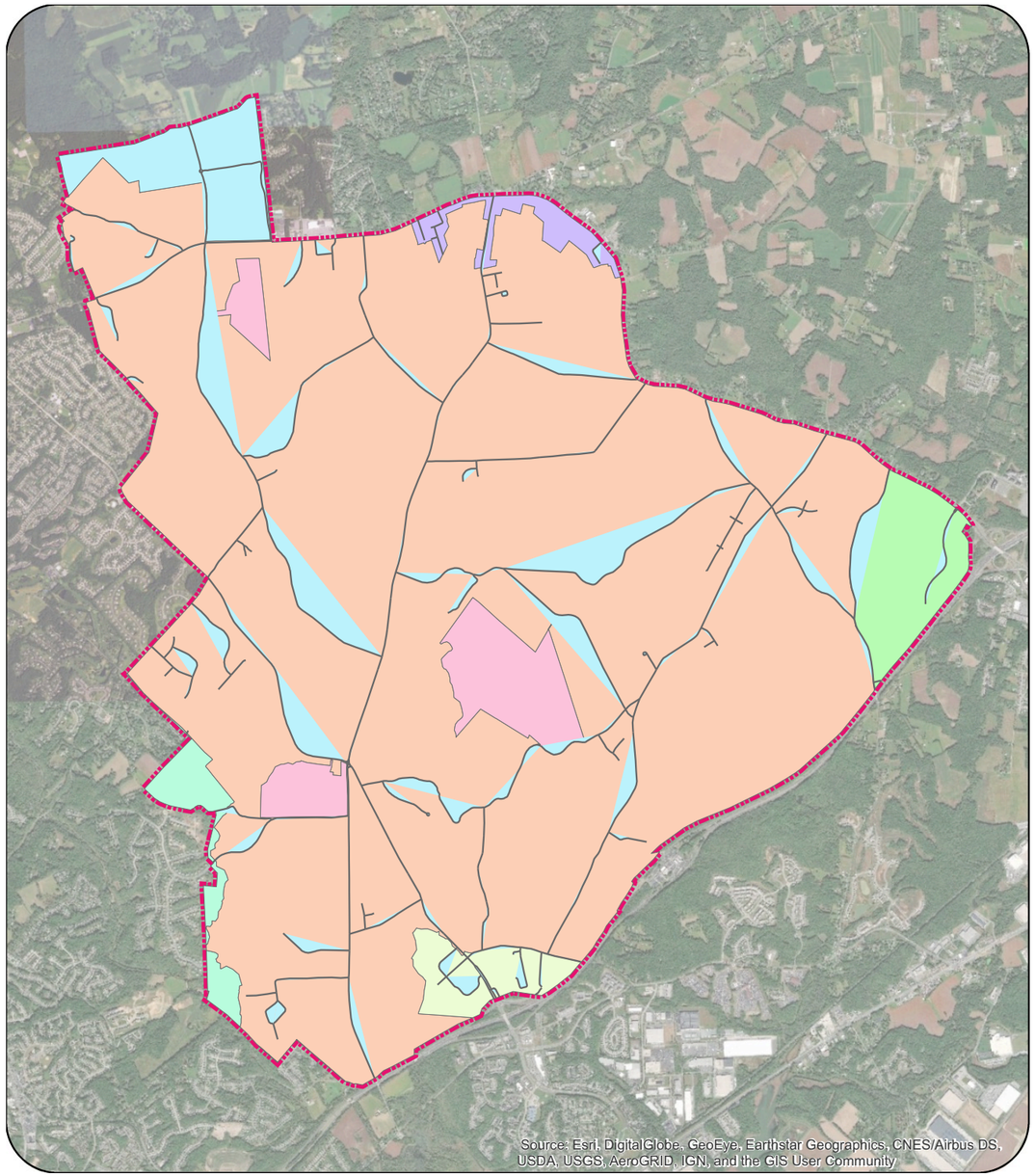
Schucks Road Regional Complex (55 acres)

Multisport fields, pavilion, a 1.2 mile trail (a small portion is a sensory trail), and a playground

Tudor Hall

Once the home of John Wilkes Booth. Listed on the National Register of Historic Places

Parks



Adopted Land Use Plan 2016

Typical Views by Land Use Plan

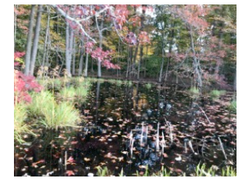
Agriculture


Harford Community College


Light Industrial


Mixed Office Zoning


Parks

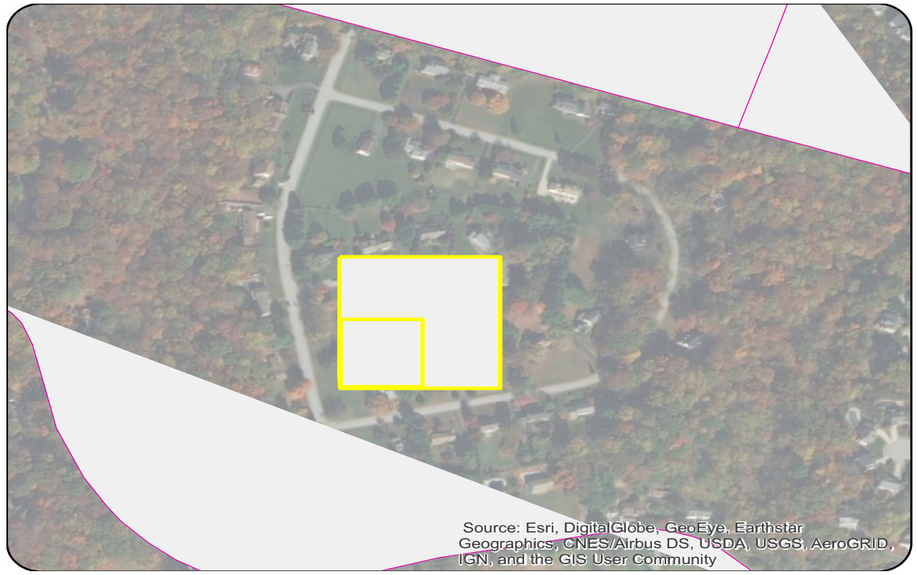



Legend

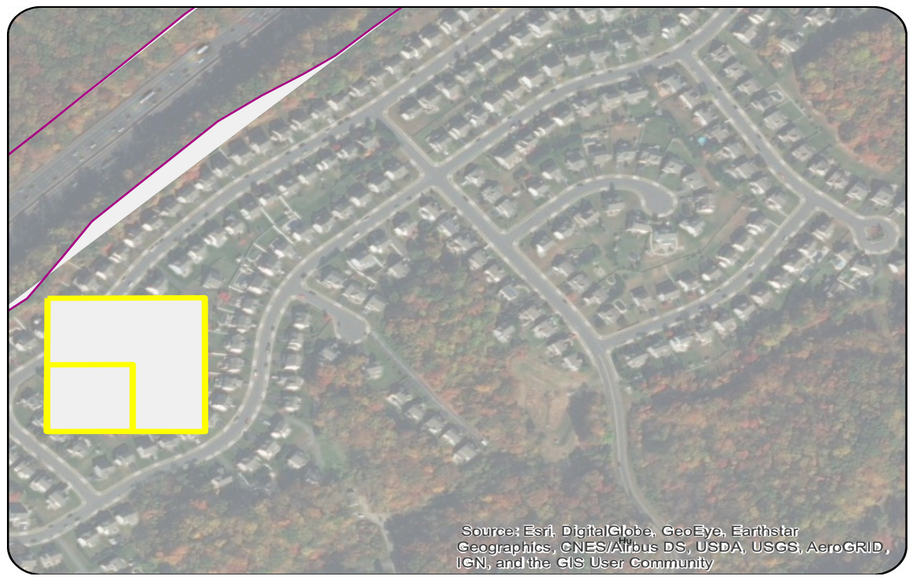
- Agricultural
- Harford Community College
- Light Industrial
- Mixed Office
- Park
- Univ. Center of NE Maryland
- Rural Village
- Crewswell Boundary
- Creswell_Street_CenterLines

Adopted Land Use Plan 2016

Zoning Classification Patterns



Typical Single Family Homes



Typical Single Family Homes

Zoning Classification R1: Up to 1.8 DU per Gross Acreage

This R1 zoned development tract contains a total of 182 dwelling units on 182 acres, which yields approximately 1 dwelling units per gross acreage. Within the selected 4 acre area shown in yellow, there are an average of 1.5 dwelling units per acre.

This R1 zoned development tract contains 582 dwelling units on 500 acres, which yields approximately 1.2 dwelling units per gross acreage. Within the selected 4 acre area shown in yellow, there are an average of 4.5 dwelling units per acre.

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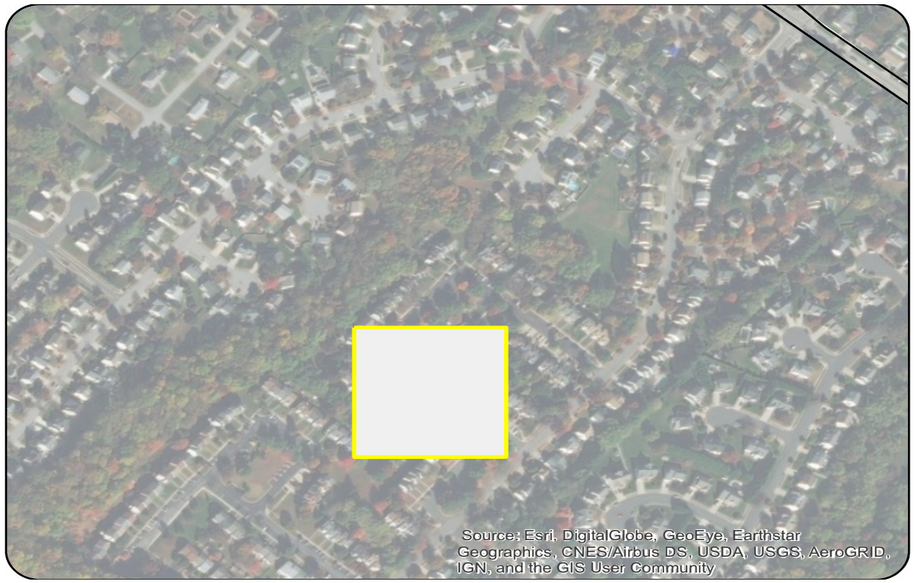
Zoning Classification R1



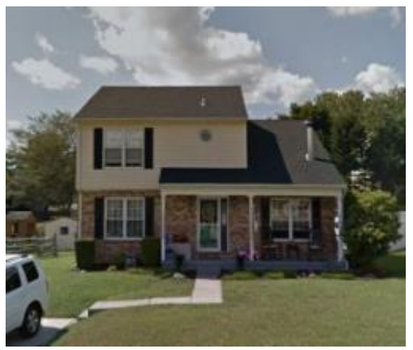
Typical Townhouses

Typical Single Family Homes

Zoning Classification R2: Up to 3.5 DU per Gross Acreage

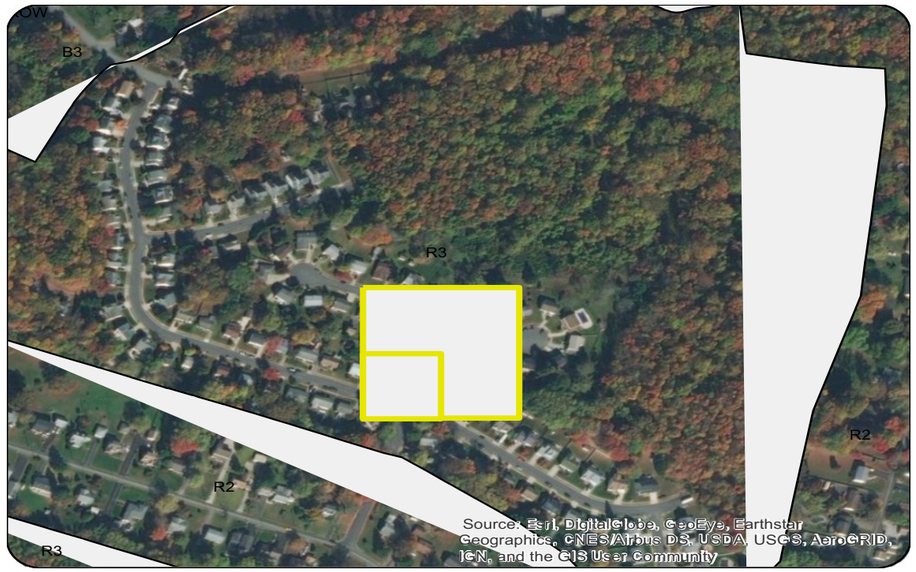
This R2 zoned development tract contains a total of 1,268 dwelling units on 482 acres, which yields approximately 3 dwelling units per gross acreage. Within the selected 4 acre area shown in yellow, there are an average of 5.25 dwelling units per acre.

This R2 zoned development tract contains 1,262 dwelling units on 587 acres, which yields approximately 2.15 dwelling units per gross acreage. Within the selected 4 acre area shown in yellow, there are an average of 3.75 dwelling units per acre.



Zoning Classification R2

Typical Townhouses and Detached Housing

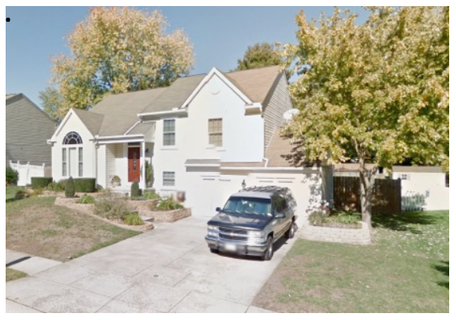


Typical Single Family Homes

Zoning Classification R3: Up to 5.0 DU per Gross Acreage

This R3 zoned development tract contains a total of 922 dwelling units on 108 acres, which yields approximately 5.4 dwelling units per gross acreage. Within the selected 4 acre area shown in yellow, there are an average of 16.75 dwelling units per acre.

This R3 zoned development contains a total of 105 units on 82 acres which yields approximately 1.3 dwelling units per gross acreage. Within the selected 4 acre area shown in yellow, there are an average of 1.25 dwelling units per acre.



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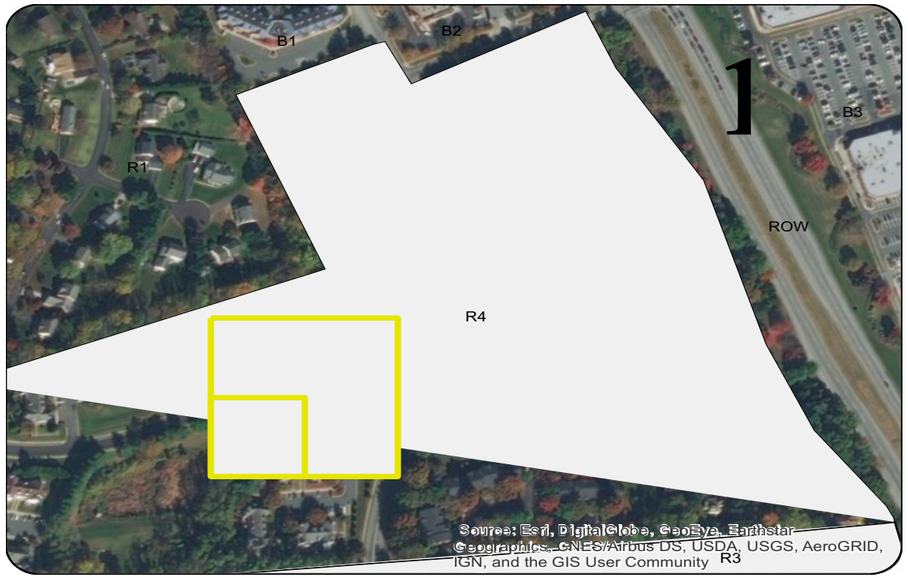
Zoning Classification R3



Typical Townhouses and Single Family Homes

Typical Single Family Homes, Townhomes and Condos

Zoning Classification R4: Up to 8.0 DU per Gross Acreage

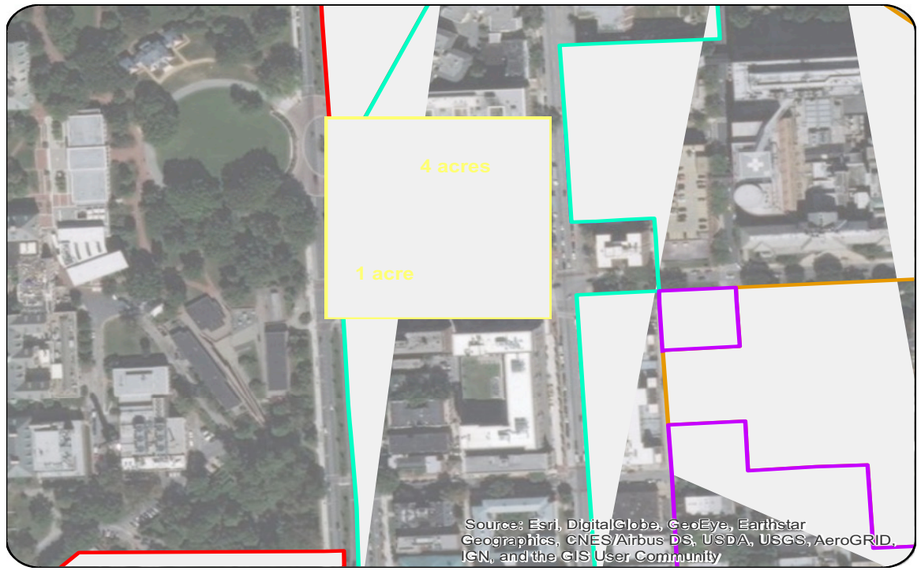
This R4 zoned development tract contains a total of 180 dwelling units on 58 acres, which approximately yields 3.1 dwelling units per gross acreage. Within the selected 4 acre area shown in yellow, there are an average of 5.5 dwelling units per acre.

Draft

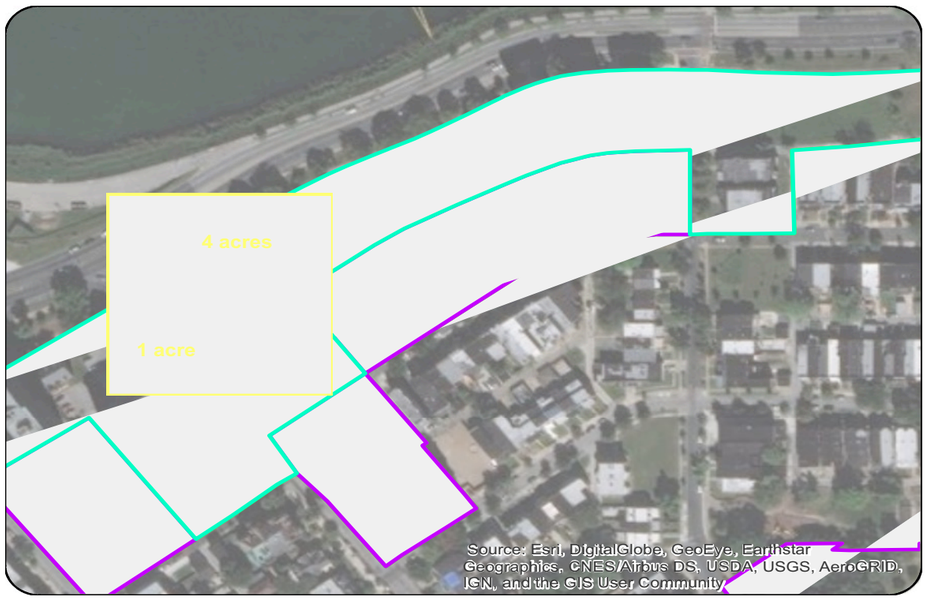
This R4 zoned development tract contains a total of 1123 dwelling units on 272 acres, which approximately yields 4.1 dwelling units per gross acreage. Within the selected 4 acre area shown in yellow, there are an average of 3.75 dwelling units per acre.

Zoning Classification R4

Zoning Classifications: Higher than 8.0 DU per Gross Acreage



The top map illustrates dwelling units of up to 8 stories. The photo on the left is mixed use on the ground level. The residential units shown are adjacent to Johns Hopkins University on North Charles Street in the Charles Village neighborhood of Baltimore.



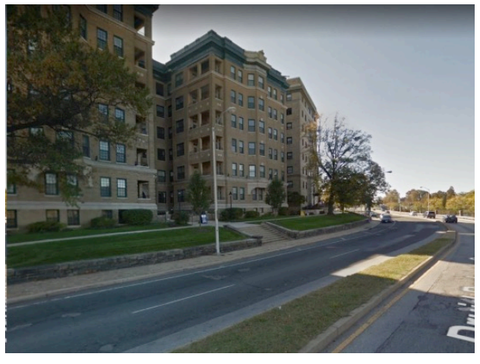
Legend

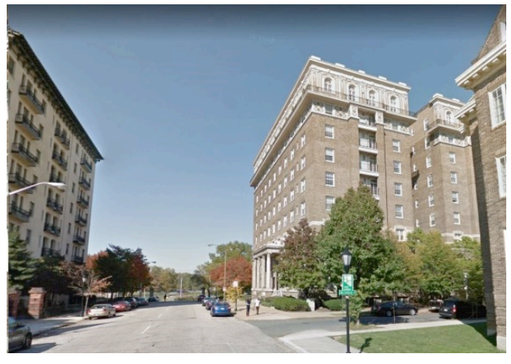
Baltimore City

Residential Zones

- R-5
- R-6
- R-7
- R-8
- R-9
- R-10

The bottom map illustrates dwelling units of up to 6 stories. The photos below are residential only. The units shown are south of Druid Hill Park in the Reservoir Hill Neighborhood of Baltimore.





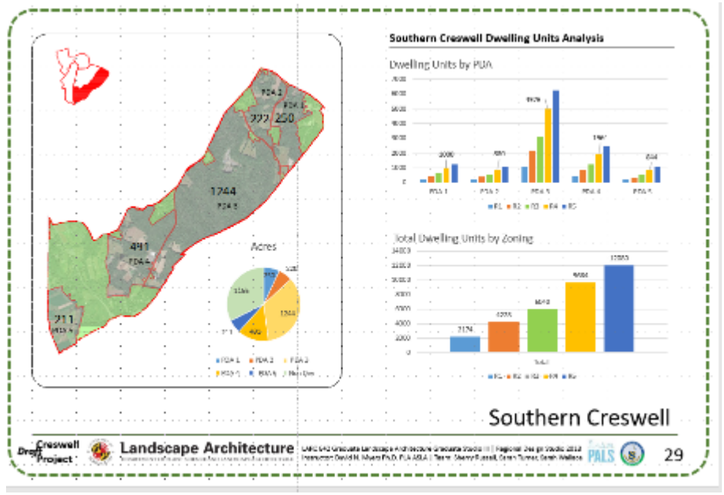
Zoning Classifications Higher than R4

Dwelling Unit Assessments

Organization of Section Information

Each section has two pages. The first page provides a map and selected photographs of the section. The second page provides a map of the potential development areas and calculations for each of these areas by zoning .

Photograph Board



Potential Development Areas

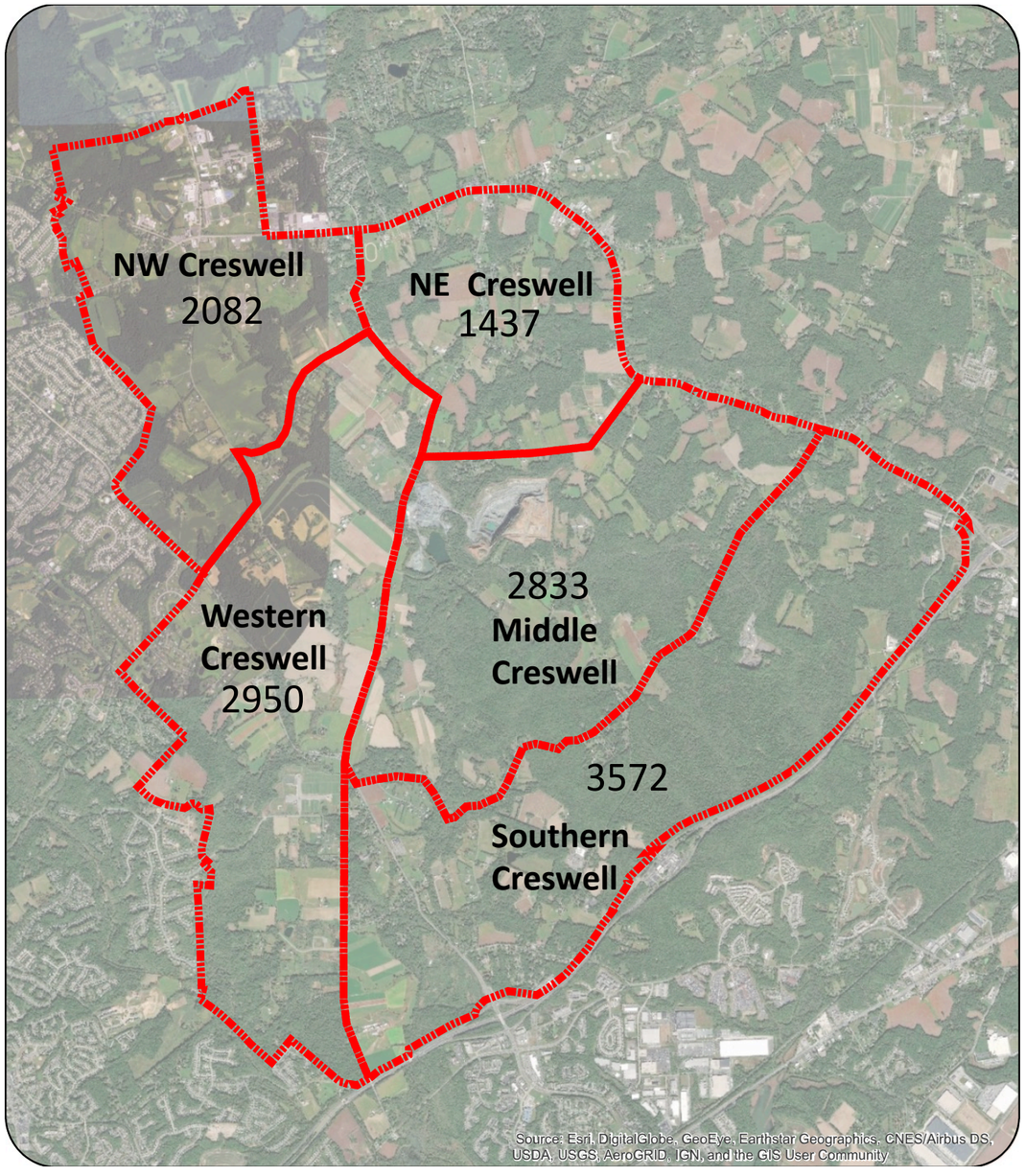
Methodology

Using major roads for division, the Creswell project area was divided into five sections to investigate potential development at a parcel or multi-parcel scale. In each section, parcels were individually reviewed with the goal of identifying parcels that would most likely to be able to be developed or to be consolidated for development in the next 30 to 40 years. Conversely, parcels that were unlikely to be developed were categorized. These included smaller parcels, developed subdivisions, easements and public lands. A portion of Harford Community College was include in a potential development area (PDA) for the consideration of opportunity for redevelopment as an education community resident center.

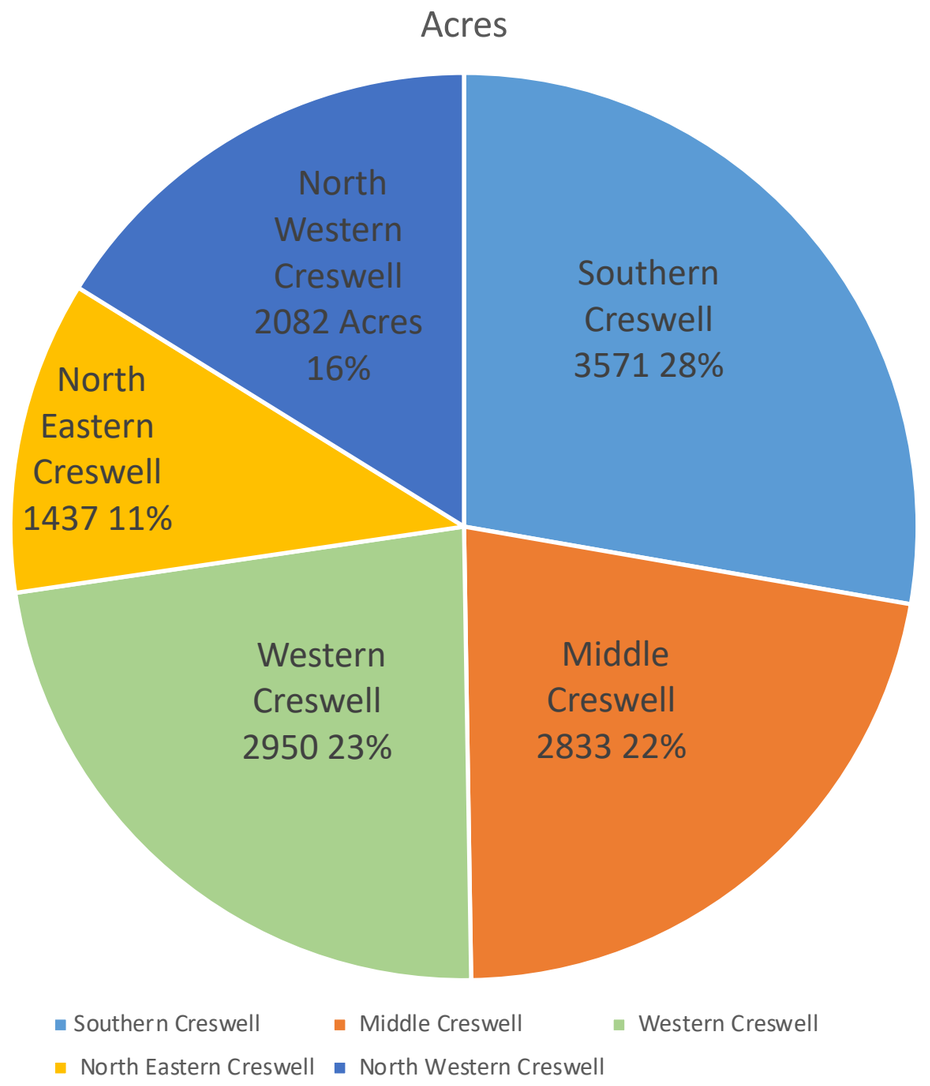
Calculating Dwelling Units

Dwelling unit (DU) amounts were calculated using a 50% net amount of units per acre allowance on the zoning. As an example, if a PDA of 100 acres was zoned R4, which allows for 8 dwelling units per gross acre, then a multiplier of 4 (50% of 8 DU) was used in calculating total dwelling units. This estimate assumes allowance for accounting for regulated areas, regulated or unregulated open space areas, and infrastructure . In assessing the development potential of the PDAs we use the current R1-R4 zones and added a fifth hypothetical zoning district of R5 to capture a higher density option. Dwelling unit targets in the graphs on pages 46 and 47 were established as hypothetical goals by PALS and the County to test potential development capacities under different density assumptions.

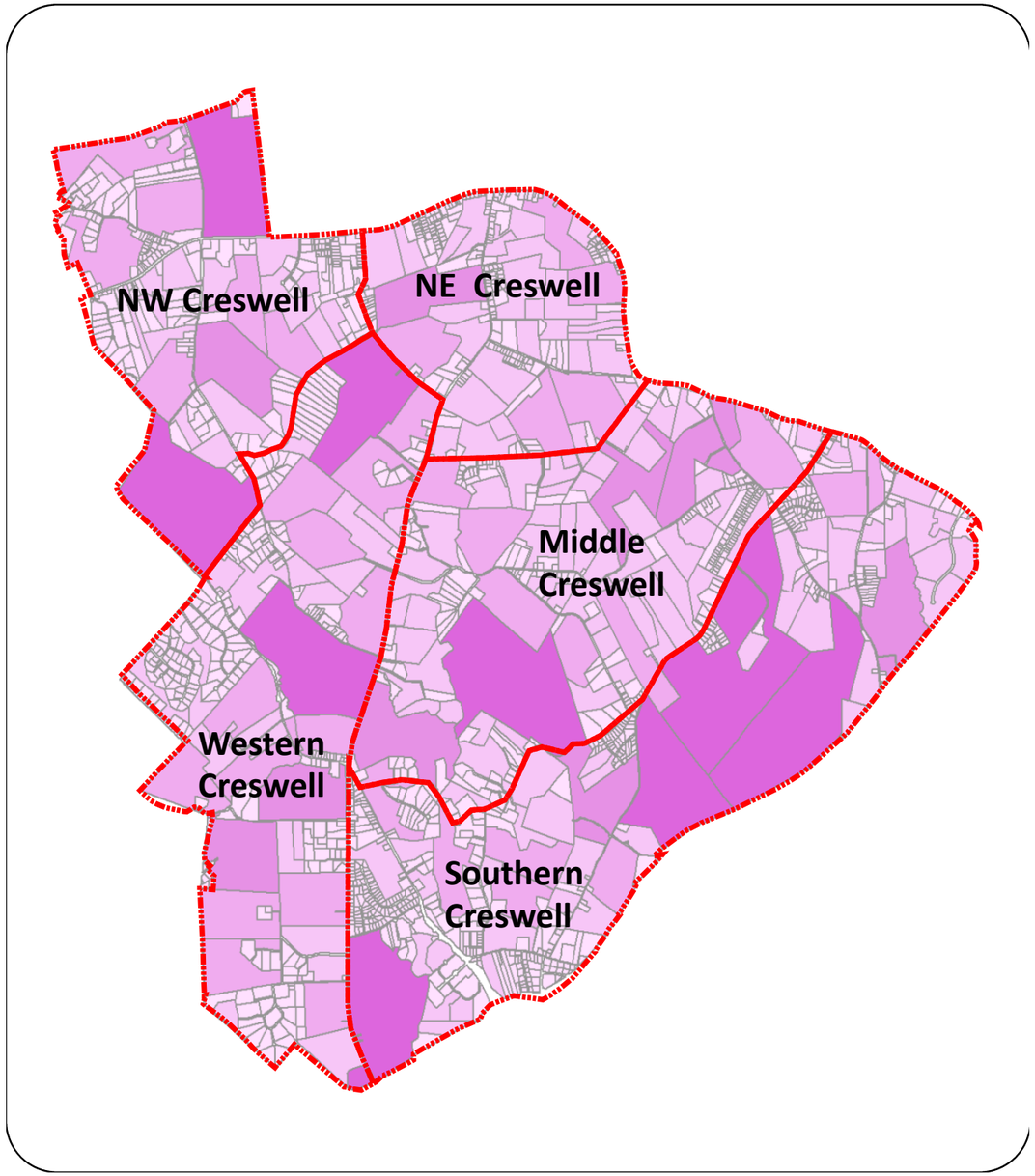
Methodology



Area in Acres of Creswell Sections



Area in Acres of Creswell Sections



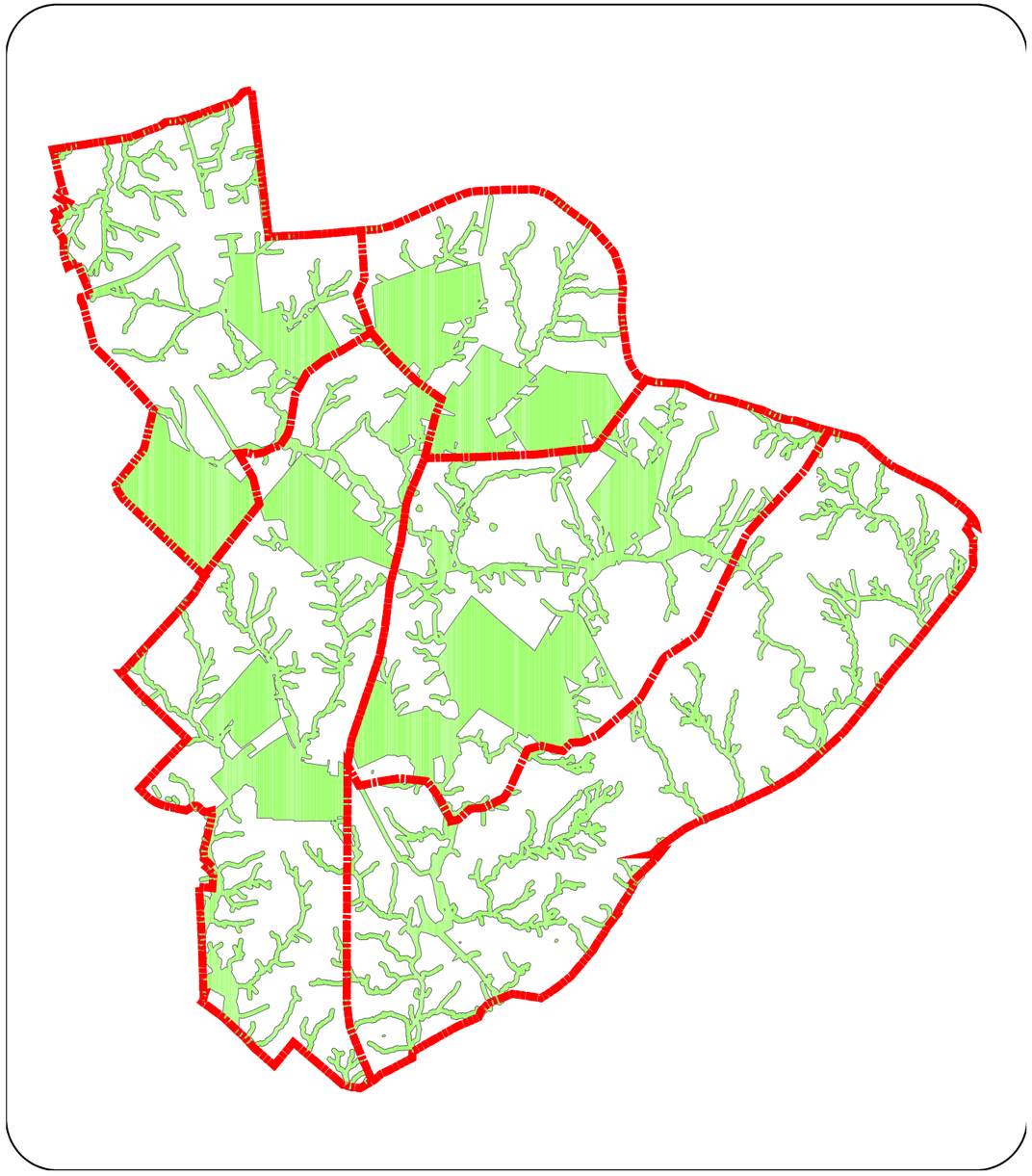
Parcels Size of the Creswell Sections

There are approximately 1,748 individual parcel records that were selected in the Creswell Area. The largest parcel is approximately 400 acres with the mean parcel size approximately 7 acres. The actual number of parcels may be incorrect due to GIS clipping from the Project Area.

Legend

< 10	1,538 parcels
10 - 50	152 parcels
50 - 100	36 parcels
100 - 150	9 parcels
150 - 400	9 parcels
Creswell Sections	

All Parcels of the Creswell Sections

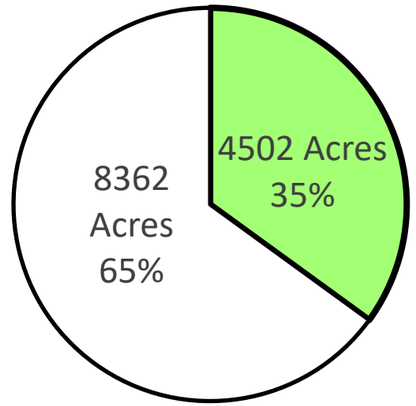


N

Easements, Public Property, and Regulated Areas

Easements, public property, and regulated area (required buffers around streams and wetlands) account for approximately 35% of the Creswell area. The map consists of the following:

1. Easements
2. Stream Buffers
3. Wetlands
4. Floodplain
5. Public Property



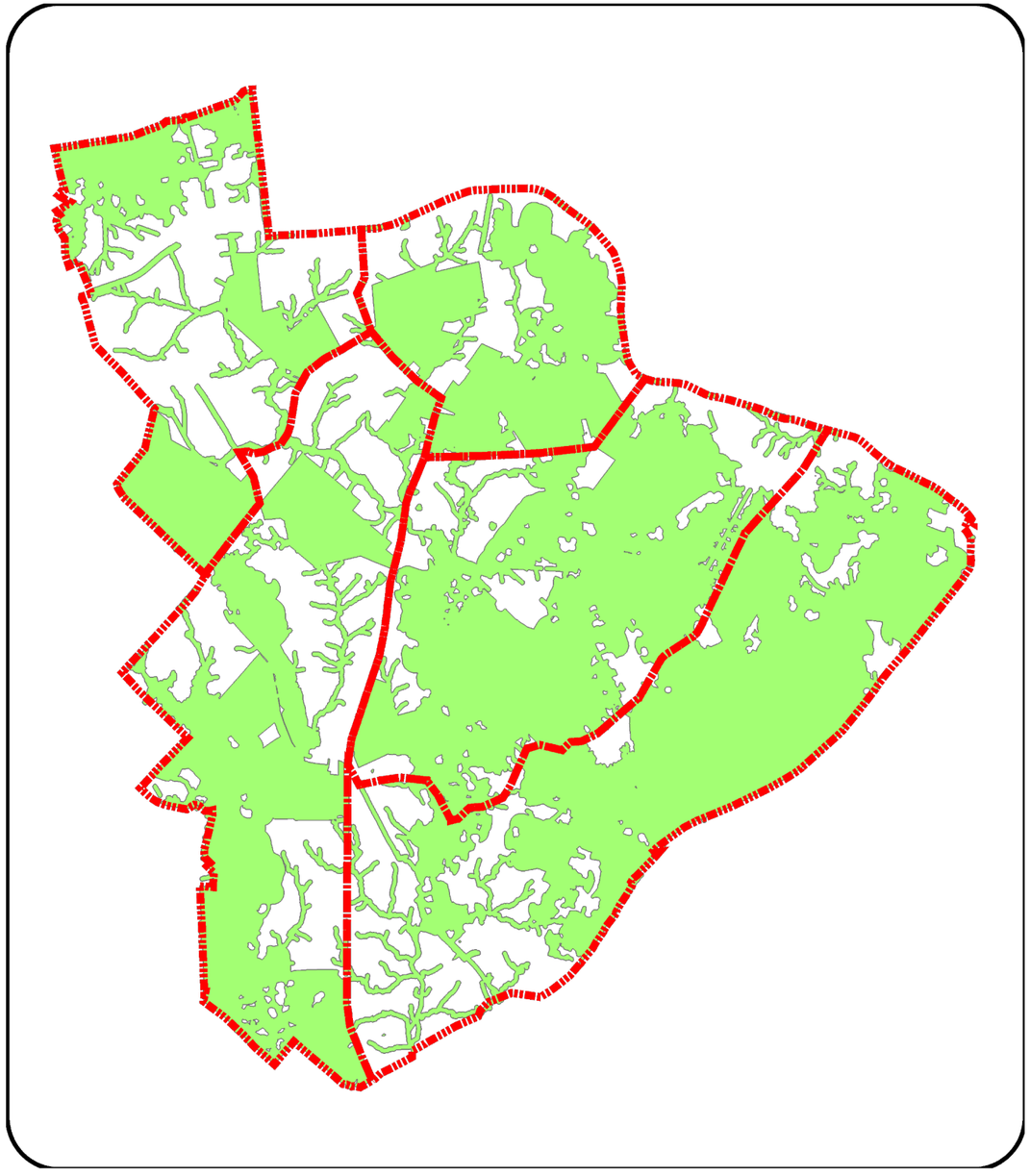
Easements, Public Property, and Regulated Areas Other

Legend

Easements, Public Property, and Regulated Areas

Creswell Sections

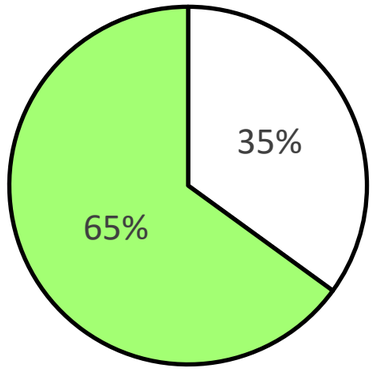
Easements, Public Property, and Regulated Areas



Green Infrastructure/Regulated/Public Property

Public property, regulated area, and green infrastructure (identified through analysis but not protected by ordinance) account for approximately 65% of the Creswell area. The map consists of the following:

1. Easements
2. Stream Buffers
3. Wetlands
4. Floodplain
5. Public Property
6. Green Infrastructure



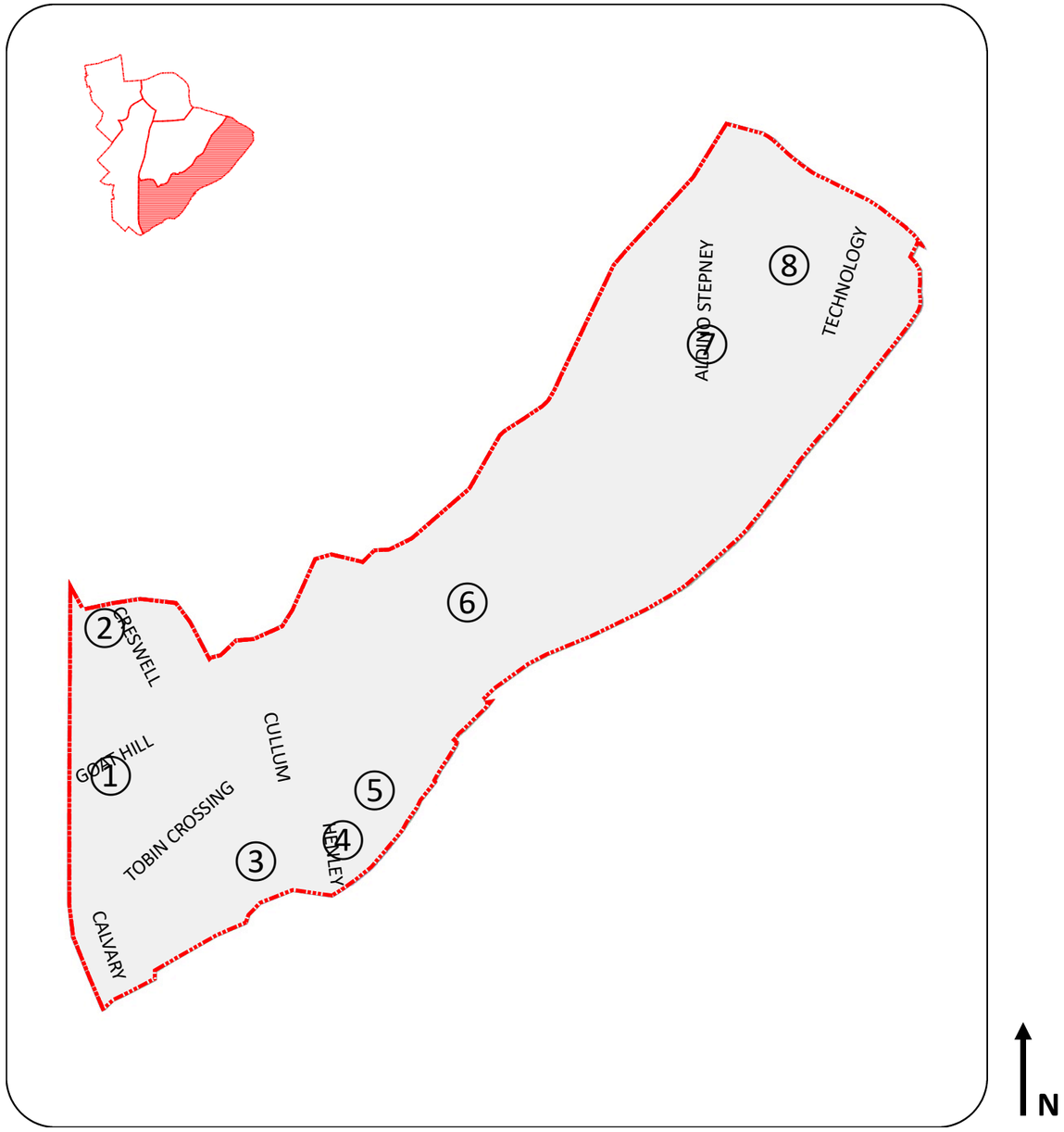
Legend

Green Infrastrcuture and Regulated Area

Creswell Sections

N

Green Infrastructure/Regulated/Public Property



Typical Photographs: Southern Creswell

1

2

3

4

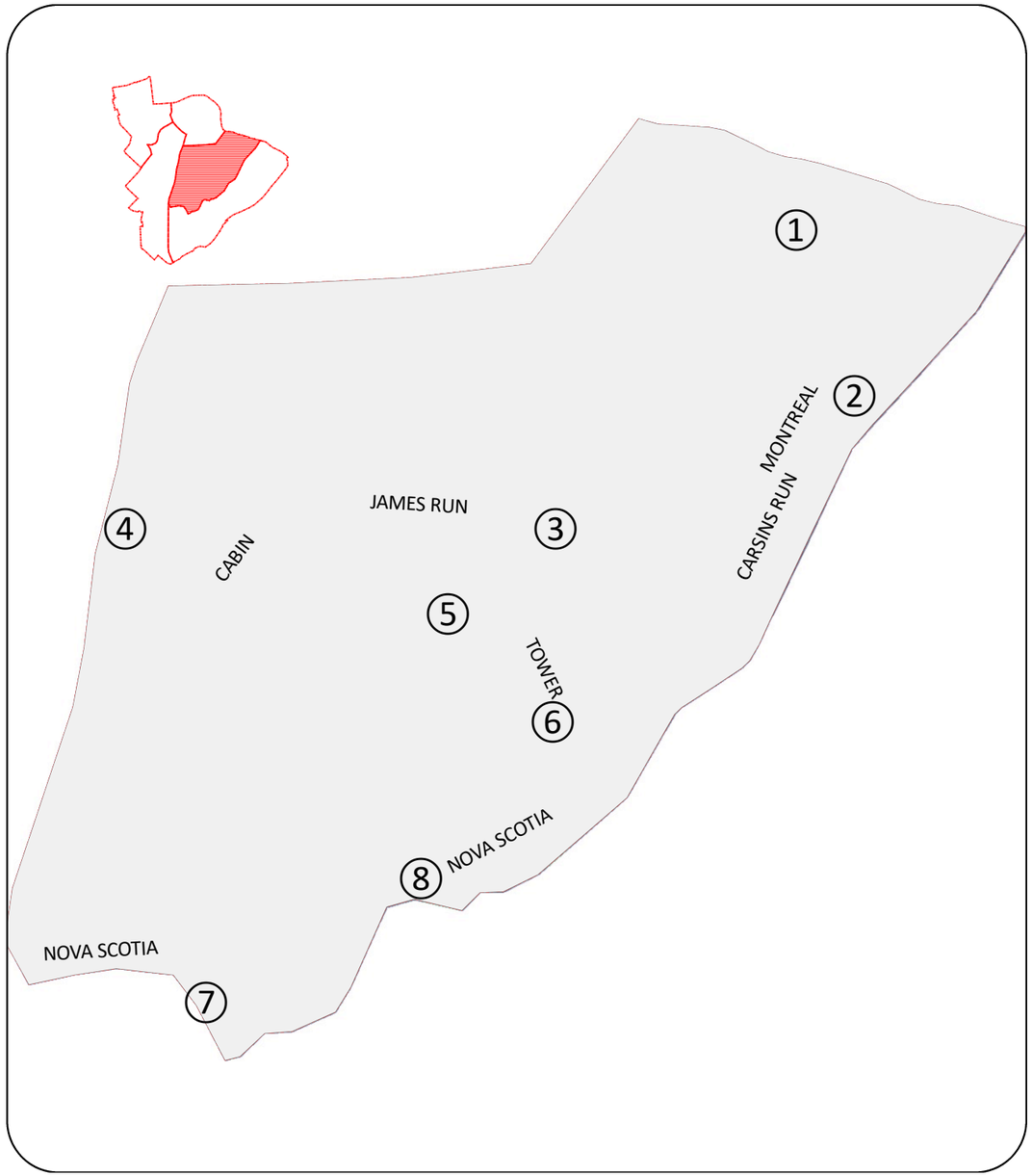
5

6

7

8

Southern Creswell



Typical Photographs: Middle Creswell

1

2

3

4

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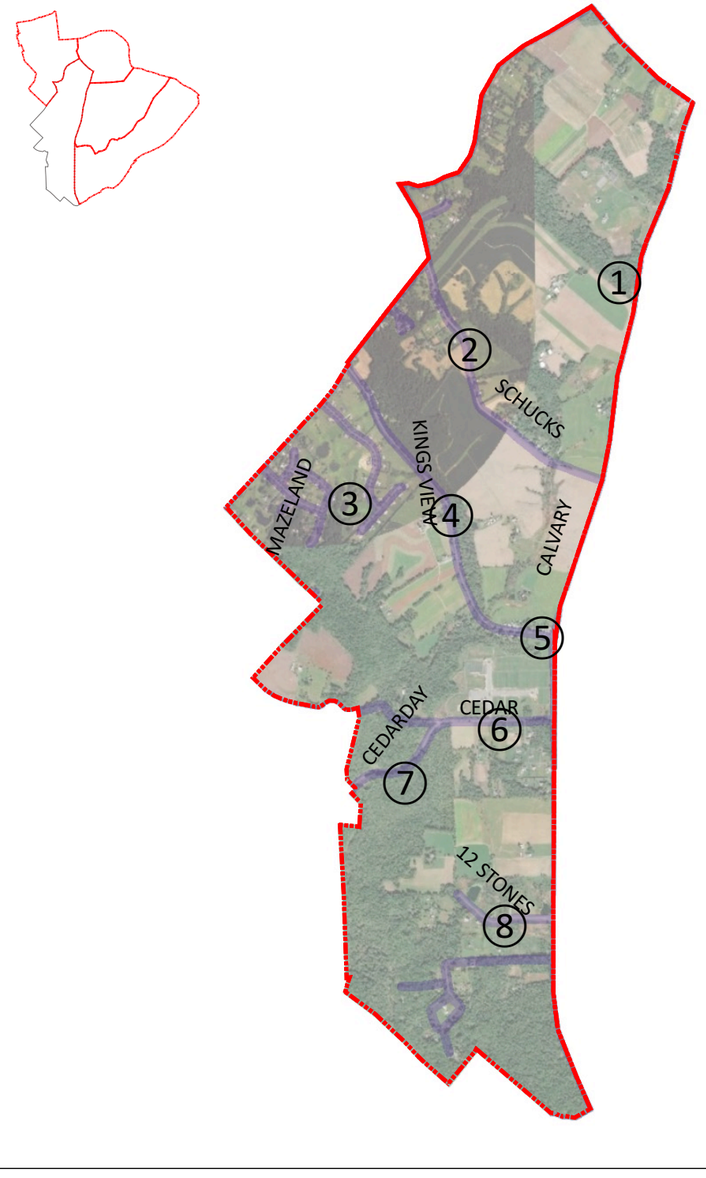
6

7

8

Middle Creswell



Typical Photographs: Western Creswell

1

2

3

4

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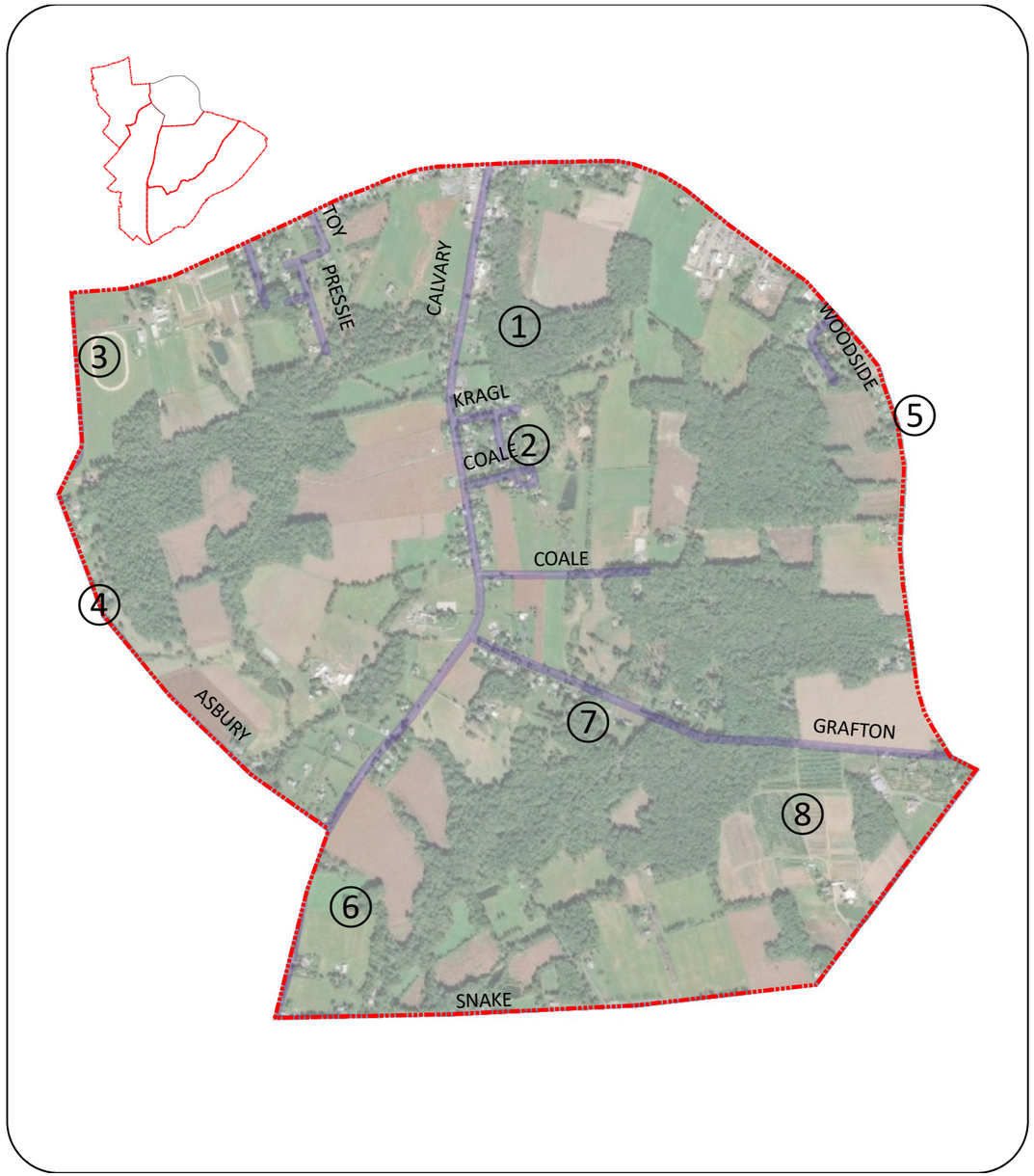
6

7

8

Western Creswell



Typical Photographs: Northeastern Creswell

1

2

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4

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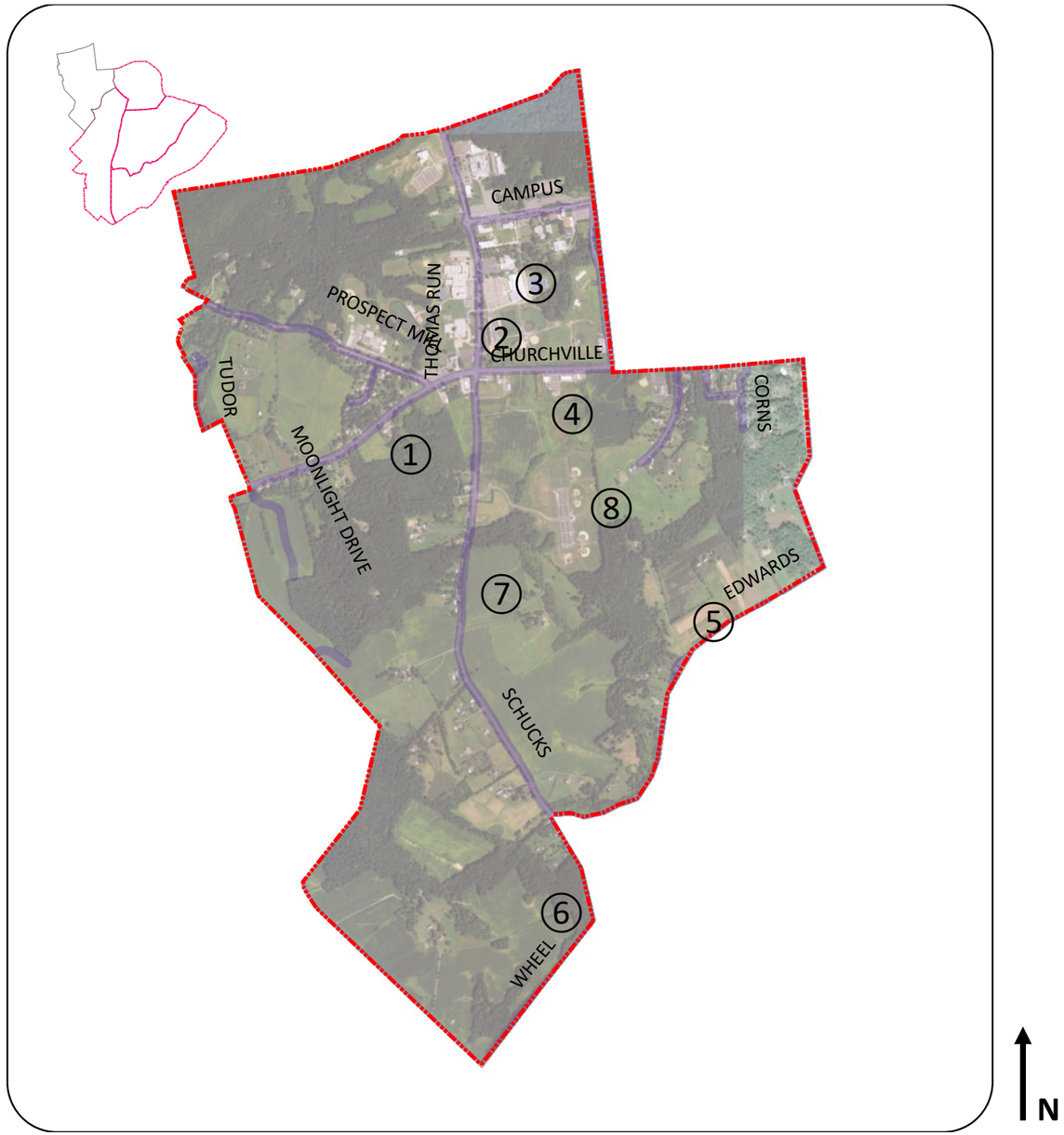
7

8

Northeastern Creswell



Typical Photographs: Northwestern Creswell

1

2

3

4

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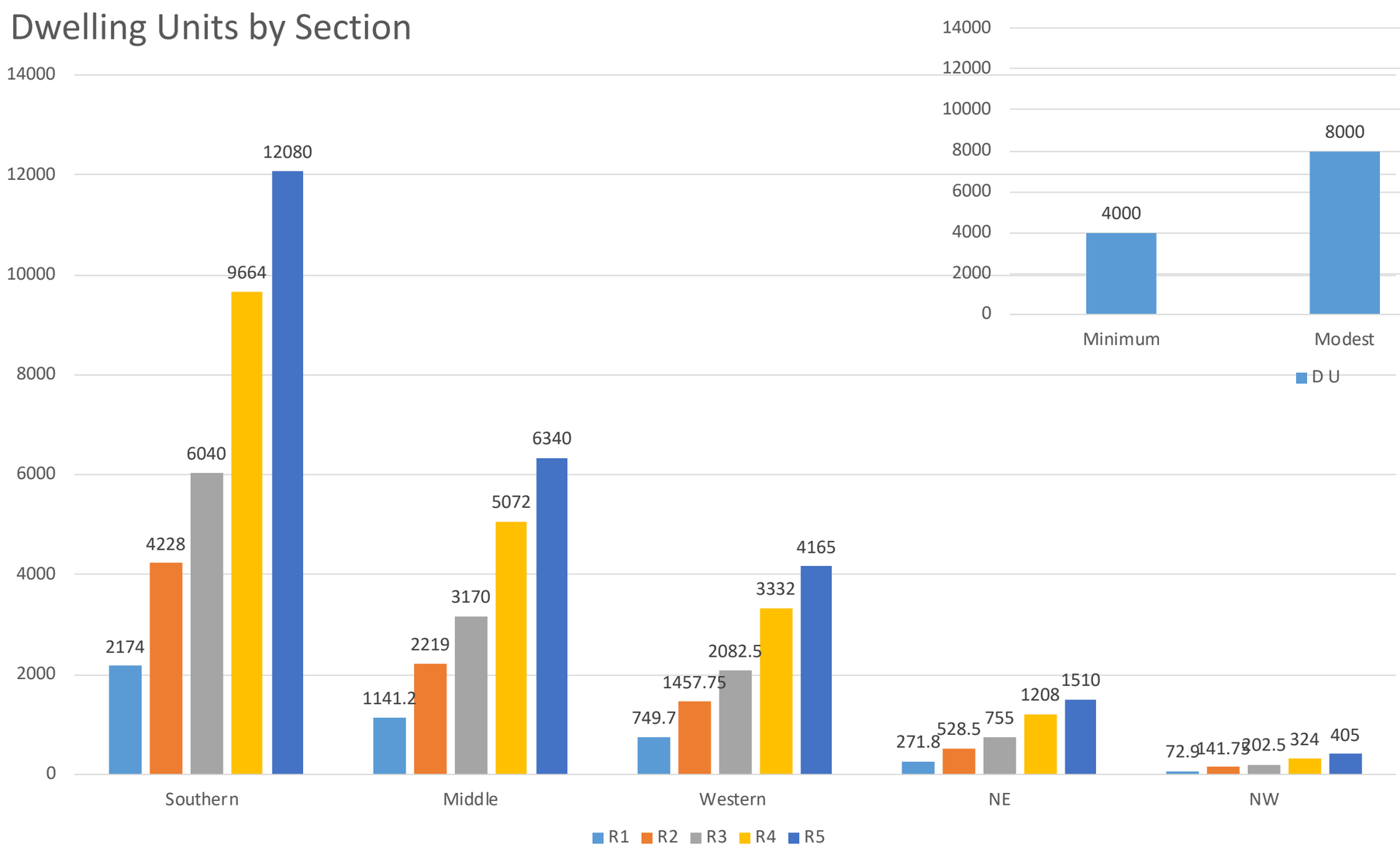
6

7

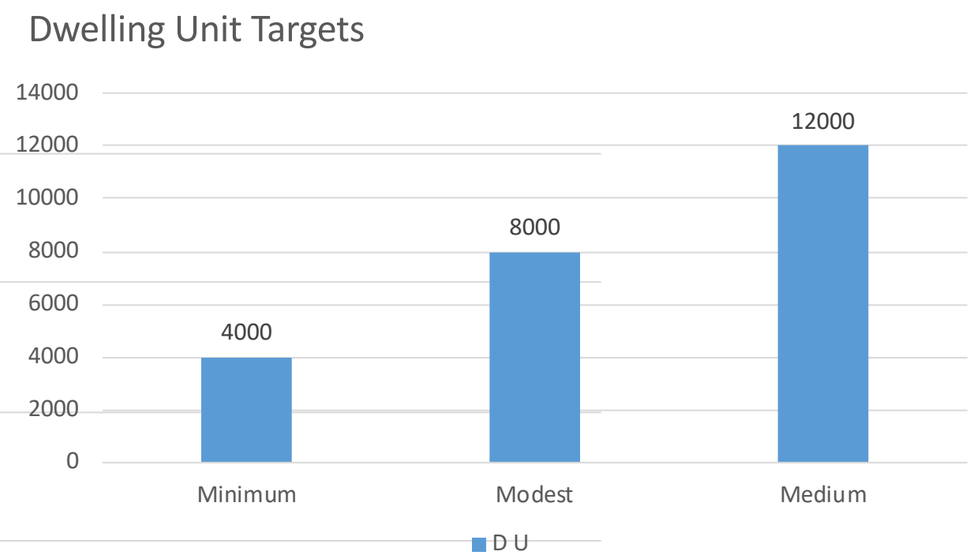
8

Northwestern Creswell

Dwelling Units by Section and Zoning

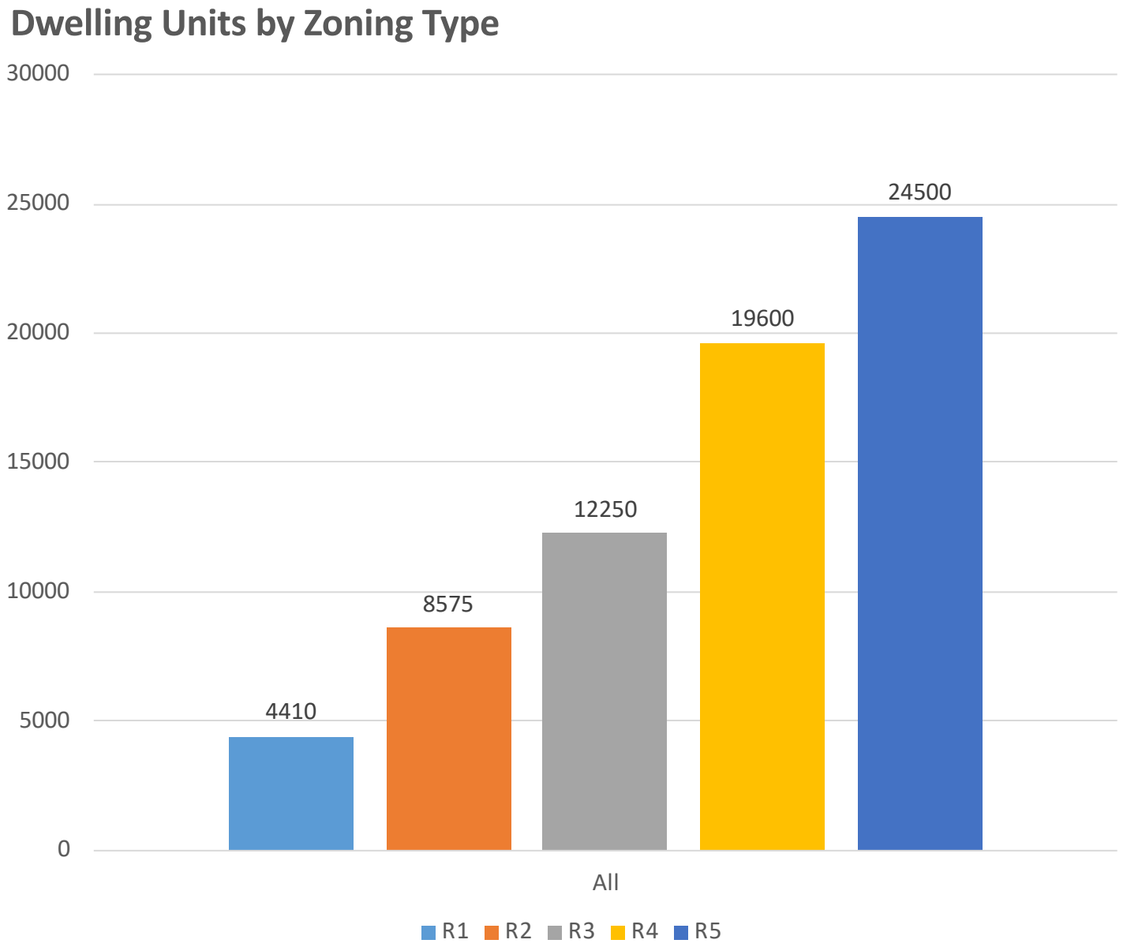


Dwelling Unit Targets



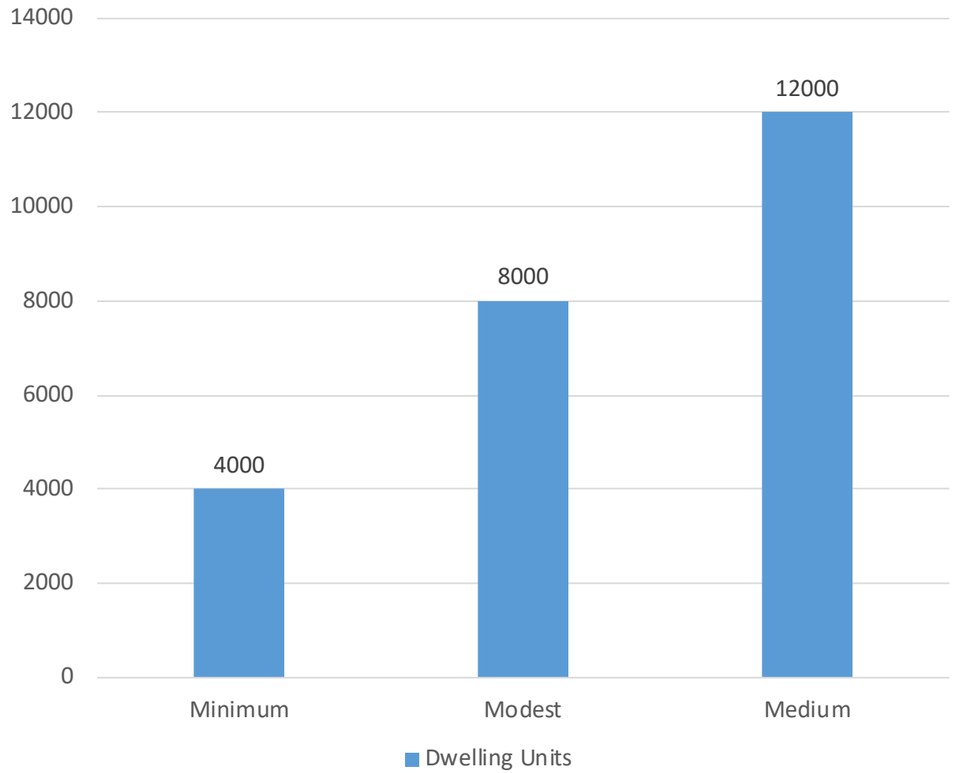
Potential Development Areas by Section

Total Potential Development Areas of All PDAs



Dwelling Unit Targets

It is clear from this analysis that Creswell can achieve and exceed the targeted number of units via a judicious mix densities (e.g. R1 to R4) without needing to zone all potential dwelling areas at R4 or R5.



Total Potential Development Areas of All PDAs